FIFTH ANNUAL REPORT

OF THE

STATE BOARD OF HEALTH

OF THE

STATE OF MAINE.

For the Fiscal Year Ending December 31, 1889.

AUGUSTA:
BURLEIGH & FLYNT, PRINTERS TO THE STATE.
1890.

MAINE STATE BOARD OF HEALTH.

OFFICE OF THE SECRETARY,
Augusta, Maine, 1890.

To His Excellency, Edwin C. Burleigh, Governor, and the Honorable Executive Council:

GENTLEMEN:—I have the honor of submitting to you the Fifth Annual Report of the State Board of Health of Maine.

Very respectfully,

A. G. YOUNG, M. D.

Secretary.

MEMBERS OF THE BOARD.

E. C. JORDAN, C. E., *President*,	Portland.
HON. LEWIS BARKER,	Bangor.
O. A. HORR, M. D.,	Lewiston.
J. O. WEBSTER, M. D.,	Augusta.
PROF. F. C. ROBINSON,	Brunswick.
CHARLES D. SMITH, M. D.,	Portland.
A. G. YOUNG, M. D., *Secretary*,	Augusta.

CONTENTS.

INTRODUCTORY.

We have the honor to present to the people of the State the Fifth Annual Report of the State Board of Health, for the year of grace 1889. No great emergency has arisen during the year, demanding unwonted activity and expenditures for the control of some extensive and fatal epidemic; no new measures have been inaugurated to attract attention by their novelty or by other meretricious circumstances; but we have gone on in the even tenor of our way, carrying out the methods already in use for educating the people in the gospel of hygiene, and for aiding them in the control of those familiar but destructive pestilences that are always with us.

We do not undertake, in this report, to give a detailed account of all the work undertaken and accomplished by the Board. Such a report would contain a great amount of correspondence with local boards and individuals, consisting largely of repetitions of matter already published; it would make this a large volume, which would have little practical value except for those directly concerned, to whom the information that it would contain has been already communicated. Such parts of this correspondence as are of general value and interest can be better utilized in articles intended for general instruction and information, such as that presented by the Secretary under the title of Various Sanitary Topics.

Sanitary Progress. This is a time of rapid progress in sanitary matters, and we believe that the State of Maine is, in most respects, keeping well up in the procession. When we consider that only five years ago this Board was organized, and that then, as a rule, the knowledge of our people in regard to hygienic principles and practice was of the most primitive character, the present condition of things is gratifying in the extreme. A fuller knowledge of the epidemic infectious diseases, the conditions under which they may be imported and spread, and the means by which, and extent to which, they can

be controlled, have taken away much of that terror born of ignorance with which they were formerly regarded. On the other hand, a fuller knowledge of the nature of our domestic pestilences, the conditions under which they are liable to be communicated, the necessity for their control by public sanitary authorities and the measures necessary for its accomplishment, have awakened the people from the supineness with which their progress was wont to be looked upon, and have made them generally ready to coöperate in those measures necessary for protection.

During the past year we have seen evidences that this work has gone on; that the people have become more enlightened in regard to the nature and dangers of infectious and contagious diseases and the practicability of securing immunity from them, and more ready to coöperate with the local health authorities in the means necessary for their restriction. But not to take too rose-colored a view of things, this is by no means yet the case universally, and the necessity for continued work by precept and example, is still sufficiently obvious.

Contagious and Infectious Diseases. Physicians are required to report promptly, to the local boards, their cases of contagious and infectious diseases, especially small-pox, diphtheria, scarlet fever and typhoid fever; and local boards are requested to make weekly reports to the State Board during the prevalence of such diseases. Such reports have been received quite promptly from a majority of the towns; but from 159 out of 434 no reports of contagious diseases have been received, either in weekly or annual reports. As there are among these several of our largest towns and one city, it is not presumable that none of them have had cases of these diseases.

In some instances, probably, the fault is primarily with physicians who neglect to report their cases. Local boards should insist that such reports be promply rendered—adopting legal measures of compulsion when necessary—and they should in turn report promptly to the State Board. The Secretary has continued to furnish weekly reports of these diseases to the newspapers of the State. The dissemination of such information has been objected to by some persons, probably on the ground that "where ignorance is bliss, 'tis folly to be wise." Not having adopted this sentiment as the motto of our Board, and not believing that it is in consonance with the spirit of this age, we have, while carefully considering such objections, unanimously decided to continue the publication of these reports.

There has been a considerable prevalence of diphtheria for the year; 543 cases having been reported from 138 towns. Unfortunately, this disease is often difficult of recognition, especially in the early stages; and the seeds of an epidemic may be widely disseminated before danger is known to exist. But besides this there is still too much carelessness in known cases of the disease. The prohibition of public funerals for its victims is not thoroughly enforced, there is still need of public education in its regard. Here, at least, *ignorance* is liable to prove something very different from *bliss*.

There does not seem to have been a great prevalence of scarlet fever during the year—there having been reported to us 236 cases from 82 towns. In this disease, as in measles, while cases occur every year, its epidemic prevalence is more or less periodical, as new crops of children grow up who have not already experienced an attack. The scarlet fever poison is so tenacious of life, and clings with such tenacity to articles of clothing, etc., that have become its habitat, that there are probably at all times, in nearly all communities, abundance of germs ready to develop whenever they can find an unexhausted soil. This is shown by the frequent appearance of sporadic cases, whose origin cannot be traced, while it is not to be doubted that each received its poison, directly or indirectly, from a preceding case of the same disease.

The occurrence of cases of typhoid fever is more of an opprobrium to a state or community than that of the diseases already mentioned. While diphtheria and scarlet fever are eminently contagious from person to person, typhoid fever probably never exhibits this quality, but is purely an infectious disease, the poison developing outside of the body from which it is excreted mainly in the intestinal discharges, and being received into a new host through the medium of the food and drink, especially the latter. We call its existence opprobrious, because the means of destroying this poison, and thereby preventing its development and the infection of others, is so well understood and so easily carried out.

To what extent the water supplies of our State may be infected by the typhoid fever germ, it is impossible to tell. Chemical analysis will give little light upon the subject; for if a stream or river has received the dejections from a case of typhoid, it cannot be considered, at any lower point, a safe source of water supply. However pure the water may be chemically, there is no certainty that it does not contain the specific cause of this disease.

Two hundred three towns have reported 566 cases of typhoid fever during the year. It will be seen that it was much more generally prevalent over the State than either of the diseases previously mentioned. The most extensive outbreak was in Bangor and Brewer, both taking their water supply from the Penobscot river. And first it is worthy of note that in the towns upon the Penobscot above Bangor, there were reported 53 cases of typhoid fever for the year against 15 in 1888, or three and one-half times as many in 1889. Almost the same ratio is preserved in Bangor—which had 51 cases in 1888 and 160 (with 40 deaths) in 1889—and in Brewer—with 8 cases in 1888 and 32 in 1889. It seems apparent that there was some common cause for the great prevalence of typhoid along the Penobscot. These figures furnish food for thought, but do not present the data upon which to build final conclusions. At the top of page 123 of this report, will be found the opinion of the Secretary of the local board of Orrington in regard to the cause of four of their cases

Any statistics that we may be able to collect in regard to the health of the State, under present conditions, and any deductions we may draw from them, are of very slight value. We lack a substratum of positive facts on which to found scientific conclusions that are something beyond mere theories, in regard to our sanitary condition. With a view to this end, we purpose to perform one of the duties incumbent upon us by virtue of the act establishing this Board, by suggesting to the legislature the enactment of a law for

THE REGISTRATION OF VITAL STATISTICS.

Any proposal to establish and maintain, by law, a system of collecting and utilizing vital statistics, requires that claims for the need of such system must rest upon some evidence of material benefit to the community at large in its well-being and varying interests.

It is pertinent to the subject under consideration to define the object of vital statistics. Nothing can do this more clearly and concisely, than the words of Dr. John S. Billings, United States army, a recognized authority as a statistician, which affirm that "the object of vital statistics is to classify and arrange the facts relating to the quantity and character of human life under different circumstances, for the purpose of determining the effect upon it of each of these circumstances taken singly or of two or more acting together."

The Secretary and members of this Board are in almost daily receipt of communications from various official and private sources, both within and without our own State, seeking the information which such a system would afford; but with annoyance and mortification it is necessary to explain that the information cannot be furnished; and there is left the unpleasant reflection that Maine, with one of the best sanitary codes given to any State Board of Health to administer, is yet almost alone in failing to supplement the value and usefulness of such sanitary laws by an efficient system of registration of vital statistics. Apart from the general advantage of such system and the question of State pride, there is the fact, that the demand for its establishment is wide spread and constantly reiterated by a large and intelligent class of our citizens, for all kinds of purposes. Inquiries for this class of information come from professional men, manufacturers, corporations, libraries and literary societies, the various departments of municipal administrations and from officials of all kinds. Inability on the part of the Board to comply with these requests becomes a serious impediment to the accomplishment of what, it is convinced, is not the least important of its functions, and must be a serious reflection upon its efficiency in comparison with the state boards of other states.

In the January number of the *Sanitary Inspector* for 1889, some reasons for such legislative action as would establish a system of registration within our State were stated as follows:

"1st. It forms the basis of all sanitary work. In England their improved system of registration of births, marriages and deaths was begun in 1837, and since then it has served as a guide to indicate the places where there has been the greatest need of taking measures to improve the public health. If, in a given town it is found that the death rate from typhoid fever, consumption, diarrhœal diseases of children, or other diseases is higher than it ought to be, the local government board institutes an inquiry into the causes of the prevailing high rate of mortality. As the result of these inquiries local boards have been led in many of the towns to take measures which have reduced the death rate in a marked degree. Massachusetts has had its system of registration of vital statistics for many years and finds its records of the greatest value in determining general and local rates of mortality, or whether a given disease is less or more prevalent than formerly.

2nd. To prevent the concealment of crime. The indispensable provision of modern registration laws which requires a certificate from friends or the attending physician of the cause of death, and a burial permit, is an assurance of safety in this direction.

3d. To ensure the means of proof of personal identity and of right to property. One senator in our legislature of 1887 told the writer that it cost him fifty dollars to look up the proof of the date of a birth. The applicants for pensions in Massachusetts are furnished by the Commonwealth with the means of substantiating their just claims which our State does not accord its citizens.

4th. To ensure the means of the proof of age with reference to the prevention of election and other frauds.

5th. To assist the State in arriving at correct conclusions with regard to measures of internal economy, taxation, employment and commerce.

6th. To furnish a record which is always available in tracing the genealogy of persons or families.

Maine stands alone among the New England States in having no system of registration of vital statistics, and consequently is like a ship at sea without a compass as regards her knowledge of where she stands in the health scale. We think we have good reasons for *surmising* that there is no State in the Union with a lower general death rate. If this is true, the proof of the fact would be worth something. If, on the contrary, the local death rates in some of our towns were making the general death rate higher than it ought to be, the knowledge of that fact would aid in inducing them to improve their condition."

The value of a Bureau of Vital Statistics to our State Genealogical and Historical Societies in the prosecution of work, the results of which continually reflect credit upon themselves and honor upon the State, is almost self evident.

Careful inquiry among all the classes of people likely to be affected has elicited the information that although differences of opinion may exist as to the most feasible methods of securing such statistics, there is great unanimity of opinion as to the need and advantage of the information to be derived after the statistics are secured and utiliz d.

The city clerk of the largest municipality in the State, himself an accurate, careful and painstaking observer and member of the local health board, expresses himself substantially to the effect that:

The collection of vital statistics as it appears from the standpoint of a municipal officer and secretary of a local board of health, is an entirely practical one. "The constant inquiries at my office for the date of the birth of some individual, either to show his right to be registered as a voter, or to become a member of fire or police departments; or to establish a claim in a pension case, or in a claim to succession of property, shows the need of a registry even for those purposes alone. But outside of those considerations, are those of the growth of a community and the relative increase of population from this increment. But the present method of collecting these statistics by yearly canvass of the assessors as in Portland is entirely inadequate.

"Families are constantly changing their location and intervals of a year disclose many removals from the city of families, the births in which fail to be taken. Then our assistant assessors are too much occupied in the other part of their inquiries, as to taxable property, number of polls, etc. In this city the number of births reported by the assessors averaged about 400, but since my employment of a special canvasser I have obtained, on an average, about 800 names yearly. If a canvass is to be made for births, it should be made, at least, semi-yearly; but in my opinion the law should require some more accurate method to secure the return, weekly or monthly of births, perhaps through the coöperation of those in attendance. There is very little dependence to be made upon the birthdays as at present reported, and I fail largely to get any births of children who have died under the age of one year. In marriages I am more fortunate; for the most part both magistrates and ministers return the marriages which they solemnize, within the month; but there is a class of marriages which are seldom returned—those which are contracted by parties who leave the State for that purpose, mostly to escape the absurd delay of five days, in the issuing of a marriage license, required by our laws. There is a penalty of ten dollars attached to this violation of the law, in omission to return the marriage, but I have never known a prosecution to be made.

"A return of the cause of death should always be made by the attending physician before a burial permit is granted. I think that I get a return of every death in the city, but it is only by the most careful watchfulness that the undertakers who return the deaths do not, now and then, drop one out. When the return was made by the assessors as required by law, it was simply worthless; the returns

were so filled with inaccuracies and omissions. As it is now the *causes* of deaths as returned by the undertakers, are grotesque to say the least, and are not in the least to be depended upon where correctness is essential, as in cases of pension claims, etc.

"In all cases of births, deaths and marriages, the names of parents should be given in order to establish connection of families. This is so seldom done now, except in cases or births—and even in those with such inaccuracy as to occasion much trouble—that it is of very little service.

"That portion of the law requiring returns to be made by heads of families is of no use whatever, with one exception which I will speak of later. In the first place so many heads of families are quite unable to make any returns; they cannot write, and to make a verbal return at the office would be quite too much to expect and almost impracticable.

2d. To many who can write, the filling out of never so simple a form is a work whose magnitude appals them.

3d. These broad provisions of the law requiring returns from so large a class never are effective, especially where these provisions are not subject to police supervision.

"The one exception in returns by heads of families to which I have referred, is this:

Our records of 20 to 40 years ago are very imperfect. In making out claims, we often fail to find any records. As the law does not limit the time in which returns may be made, it is legal even at this lapse of time for the heads of families to make returns, have them recorded, and thus secure, for their legal use, certified copies of the record.

"The necessity of an accurate and careful collection of births, deaths and marriages, for the purposes of comparison of growth or the prevalence of any causes which retard or promote the growth of a community, seems to me so self-evident that argument is almost unnecessary."

Some of the most cogent reasons for the desired plan have come to us from a gentlemen of wide experience as a civil engineer, particularly interested in sanitary work, whose belief is thus expressed:

"There is a certain practical value in vital statistics that ought to appeal to everyone. The State Board and Local Board of Health are organizations to disseminate health laws. They are the authorities first appealed to when communities or individuals realize that

their health is being endangered by the ignorant and wilful acts of other communities or individuals. The tracts that they are constantly putting in circulation are such as these:

"'Health is the capital of the laboring man.' 'Wealth is the income from the work which is the outcome of health.' 'Pure air, pure water and a pure soil;' and a paraphrase of the old penny and pounds' proverb recently uttered by the most eminent sanitarian in the world; 'take care of the health rate and the death rate will take care of itself.' Now what is the death rate of this or that place in the State of Maine? Certain sections are considered valuable because the land is fertile; because a water power makes manufacturing interests profitable; because the location is a favorable one for the transshipment of goods, etc., etc.; and such places become more or less thickly settled. Observing and progressive individuals, students of the causes of disease, insist upon the necessity of carrying out certain sanitary reforms; better drainage and sewerage. Agitation of the subject goes on, an engineer skilled in the solution of such problems is employed, and estimates are made of the expense of a remedy for the ascribed difficulties. The amount seems large to the tax payer and he claims that the value of or the necessity for such work is not proven to his satisfaction. It does not seem to appeal to him personally when reports of vital statistics kept in England are quoted showing that sanitary reform—principally sewerage schemes—has lowered the death rate in the city of London, or that there are 10,000 less deaths and 200,000 less cases of sickness than were wont to occur each year a comparatively short time ago.

"The experiences of a dozen places foreign to his own State may be quoted showing the lessons that may be learned from a study of the vital statistics, and yet he remains unconvinced because it is not brought home to him that his city or village has five more deaths and a hundred more cases of sickness each year for every 1,000 inhabitants than his neighboring city which has spent money to obtain pure water by an outside water supply, pure air by abating local nuisances, and a pure soil by a system of sewerage. A table showing the death and sickness rate of every locality is absolutely necessary as a guide to the *class* of work needed. A glance at it shows whether a town has been faithful to its own interests, words of approval of good work stand out all over it, and danger and warning signals are conspicuous if negligence exists. Nothing appeals to the people like the money value of things. If a glance at a table of

vital statistics shows the people of a city of 10,000 inhabitants that they are less well off than a neighboring city at the end of a year by the loss of the labor that fifty people would have performed, but that death seizes them, and also by the loss of labor and money incidental to 1,000 more cases of sickness, think you then a committee would not visit the other city and bring back the receipe of sanitary reform?

"Repeatedly I have known towns to delay or put off entirely very necessary reforms, simply because the data of death and disease along the borders of a foul mill pond in their midst, or those of a coast line of exposed areas of flats covered with sewerage, could not be compared with localities either naturally free from such influences or by sewerage facilities made so.

"Give us vital statistics, and health boards and sanitary engineers can tell when, where and how to act."

SECRETARY'S REPORT.

In reporting on the work of the State Board of Health for the year 1889, it should be said in the beginning that a large part of the work of the office has been devoted to securing, under the existing laws, as complete and efficient a sanitary organization of the whole State as possible. The amount of local sanitary work required of a board of health varies much, of course, with the density of population in the community or town, and with the character and condition of the people; but even in our sparsely populated agricultural towns, where, in average years, there is but little work to be done, there is a real need of the presence of an intelligent local board of health, who, whether they have before been called upon to take charge of an outbreak of infectious disease or not, have, nevertheless, received in advance printed instructions from the State Board of Health in regard to managing accidents of this kind, and are, therefore, tolerably well prepared to act promptly, intelligently and efficiently. On account of the close business relations of the rural parts of the State with the larger centres of population, the importation of infectious diseases into these more sparsely settled parts is at any time liable to occur, and how likely to occur may be judged by referring to the statement in the "Introductory" in regard to the number of towns in which outbreaks of infectious diseases were reported. But aside from the necessity of the smaller towns protecting their own inhabitants from the disastrous consequences of neglected infection, there is a question of inter-municipal obligation and equity. If a larger town incurs the expense of controlling, as efficiently as practicable, the infectious diseases, it is doing work, primarily in its own interest, and secondarily, in the interest of every other town and the whole State; and in so doing it lays every other town under obligations to take like precautions,—to do its part, though its part be small. To how

great a degree the efforts of the local boards of health of the cities may be rendered futile, may be inferred from a consideration of the fact that the aggregate of the rural population of the State is numerically much greater than that of the cities and larger villages.

The names and addresses of the members of the Board at the end of the year with the dates at which their terms of office expire are as follows:

HON. LEWIS BARKER, Bangor, term expires January 31, 1890.

CHARLES D. SMITH, M. D., Portland, term expires January 31, 1891.

J. O. WEBSTER, M. D., Augusta, term expires January 31, 1892.

E. C. JORDAN, C. E., Portland, term expires January 31, 1893.

O. A. HORR, M. D., Lewiston, term expires January 31, 1894.

PROF. F. C. ROBINSON, Brunswick, term expires January 31, 1895.

At the expiration of the term of office of Hon. Stephen J. Young, Prof. F. C. Robinson of Bowdoin College, Brunswick, was appointed by the Governor to fill the vacancy. In October, Dr. F. H. Gerrish who had, ever since the establishment of the Board, held the office of President, felt compelled by the demands of his professional work to sever his official connection with the Board. Accordingly, he sent in his resignation, and Dr. C. D. Smith of Portland was appointed to fill the unexpired term. At the quarterly meeting of the Board in January the following resolution was voted:

Resolved, That the members of the State Board of Health feel keenly the loss which both they and the State have suffered by the resignation of Dr. F. H. Gerrish, their President. A pioneer in sanitary matters in the State, he brought to the work of the Board all the enthusiasm for which he is celebrated, and we feel that any good which the Board has done is largely due to his unselfish labors in its behalf.

At the same meeting the election of President to fill the vacancy due to the resignation of Dr. Gerrish was by vote postponed to the annual meeting to be held in March, and Dr. Webster was chosen President *pro tem.* At the annual meeting in March, 1889, the following committees were appointed for the ensuing year:

On Finance—The Hon. Lewis Barker, J. O. Webster, M. D., and the Secretary.

On Publications—F. H. Gerrish, M. D., J. O. Webster, M. D., and A. G. Young, M. D.

On Disposal of Exc1eta—F. H. Gerrish, M. D.

On Ventilation—O. A. Horr, M. D., E. C. Jordan, C. E., and A. G. Young, M. D.

On Summer Resorts—E. C. Jordan, C. E., and A. G. Young, M. D.

On Sewerage and Drainage—E. C. Jordan, C. E., and Prof. F. C. Robinson.

On Water and Water Supplies—Prof. F. C. Robinson, and A. G. Young, M. D.

On School Houses and School Hygiene—J. O. Webster, M. D., and A. G. Young, M. D.

VACCINATION OF OPERATIVES IN PAPER MILLS.

The law passed by the last legislature entitled "An Act to provide against the danger of the spread of small-pox from paper mills," which was printed in the last annual report, and which we reproduce in this connection, did not go into effect early enough to be put into practical operation last spring. In the fall, however, the local boards of health in those towns in which paper mills using rags are located—Westbrook, Poland, Topsham and Gardiner—attended to their duty as provided in the law, and found the owners, agents and supe1intendents willing to co-öperate in the work. In the following are given the special report on this subject made by each of these local boards of health to the State Board, in answer to a circular of enquiry sent from this office.

[Form 18.]

REPORT OF THE LOCAL BOARD OF HEALTH OF——— ON THE VACCINATION OF OPERATIVES IN PAPER MILLS.

1. Please give the names of the paper mills in your town that use rags in the manufacture of paper.

2. Did the owners, agents or superintendents last fall comply with section 3 of the act?

3. Did your local board of health comply with the requirements of section 4 of the act?

4. Please give the number of persons whom you found employed in and about each paper mill.

5. How many persons were found who had never been vaccinated?

6. How many were found fully protected by a recent vaccination?

7. How many were found insufficiently protected by vaccination?

8 How many were vaccinated in accordance with your order?

9. Did all persons found imperfectly vaccinated comply with your requests as regards vaccination?

10. If not, what action was taken by your board and by the owners or agents of the paper mills?

WESTBROOK.

1. Cumberland and Presumpscot Mills.

2. The owners and agents complied with section 3 of the act.

3. Our local board of health attended to the duty as specified under section 4.

4. We found 219 persons employed.

5. Three persons were found who had never been vaccinated.

6. The number of persons found fully protected by recent vaccination was 195.

7. Twenty-one persons were found insufficiently protected by vaccination.

8. Twenty of these were vaccinated in accordance with our orders.

9. One person only failed to be vaccinated in compliance with our requests.

10. The attention of Mr. Warren, the agent, was called to the fact that one man employed by him declined to be vaccinated, but nothing has been done.

The examinations by this board included all persons employed in the rag-room, all drivers of teams that haul rags, all engaged in the cutter rooms, and all persons working in the mills that boarded in houses with persons who might come in contact with infected rags or persons.

Yours truly,

H. K. GRIGGS.

Secretary Local Board of Health, Westbrook.

[In reply to a letter from this office Mr. Jno. E. Warren, Agent of the Cumberland and Presumpscot Mills, writes that the retention of the unvaccinated man was an oversight, and that he has given him notice to quit, and assures us that there was no intention of evading the law. In this connection it is due Mr. Warren and the owners of the mills to say that they have always shown a ready willingness and desire to co-operate with the State Board and the local boards of health in the prevention of infection.—Secretary State Board of Health.]

Poland.

1. The Poland Paper Company have five mills in Poland, but only one of them handles rags; I think it is called the Androscoggin Mill.

2. Section 3 of the act was complied with by the owners.

3. Our local board of health complied with the requirements of section 4 of the act.

4. I cannot give the number of persons found employed in the mill.

5. None are reported as never having been vaccinated.

6. Probably all the older workmen were found protected by recent vaccination as there was an outbreak of small-pox a few years ago.

7. Twenty-one persons were found insufficiently protected by vaccination.

8. Twenty-one persons were vaccinated in accordance with the orders of the board.

9. All persons found imperfectly vaccinated complied with our requests as regards vaccination.

10. No action was needed, as the heads of the different departments set the example by promptly complying with the request of the board and the example was readily followed by all.

These questions are answered as fully as I am able from the papers left me by Dr. Corliss, formerly the secretary of the local board of health, but who now has removed from the town. From my own personal knowledge I believe the answers are correct as far as they are given. Respectfully,

S. L. Littlefield,

Chairman of the Local Board of Health, Poland.

Topsham.

1. Bowdoin Paper Manufacturing Co.

2. The owners and superintendents of the mill fulfilled the requirements of section 3 of the Act.

3. The local board of health attended to their duties as specified in section 4.

4. Eighty-seven persons were found employed in the mill.

5. Sixty-five were found who had never been vaccinated.

6. Twenty-two were found sufficiently protected by vaccination.

7. Sixty-five were found insufficiently protected by vaccination.

8. Sixty-five persons were vaccinated in accordance with our orders.

We have complied strictly with the law and by prompt attention everything was satisfactory to our board.

Yours truly,

JAS. C. PURINGTON,

Secretary of the Local Board of Health, Topsham.

GARDINER.

1. Copsecook Mills owned by J. D. Warren & Co.

2 and 3. The requirements of section 3 of the Act w re complied with by the owners and superintendent of the mills, and section 4 by the local board of health.

4. At the time our visit was made we found fifty employes which is about the usual number employed.

5. No persons were found who had never been vaccinated.

6. All of the employes were found protected by recent vaccination.

7 and 8. None o' the operatives were found to require revaccination.

The reason why everything was found in so good condition as regards danger from contagion was that three years ago a case of small-pox originated from the rag-room, at which time all precautions possible were taken to prevent its spread. Great credit is due to Mr. Henri E. Merriam, the superintendent of the mills, for the great care he always takes to prevent any possible contagion from the rags used.

Yours truly,

E. E. LEWIS,

Secretary Local Board of Health, Gardiner.

Chapter 213, Laws of 1889.

An act to provide against the danger of the spread of Small-Pox from Paper Mills.

Be it enacted by the Senate and House of Representatives in Legislature assembled, as follows:

SECT. 1. No owner, agent or superintendent of any paper mill where domestic or foreign rags are used in the manufacture of paper shall hire or admit any person to work in or about said mill who has not been successfully vaccinated or revaccinated within two years, or to the satisfaction of the local board of health.

SECT. 2. No person shall work in or about any paper mill where rags are used, who has not been successfully vaccinated or revaccinated within two years, or to the satisfaction of the local board of health.

SECT. 3. The owner, agent, or superintendent in every paper mill where rags are used shall every year in the months of February and September, make out and deliver to the local board of health, a list containing the names, ages, kind of work, and places of residence of all persons employed in or about said mill.

SECT. 4. In the months of March and October, annually, each and every person who is employed in a paper mill, shall be examined by the local board of health as to whether he or she is successfully and sufficiently protected by vaccination and the local board of health shall in all cases be the judges of the sufficiency of the protection by vaccination.

SECT. 5. Any person who shall violate any of the provisions of this act shall be guilty of a misdemeanor, and upon conviction thereof shall be subject to a fine of not more than fifty dollars.

SECT. 6. It shall be the duty of the local boards of health within their respective jurisdictions and of the State board of health, to enforce this act as far as comes within their power, and when said State board of health knows or has reason to believe that any penalty or forfeiture has been incurred by reason of neglect to comply with said act, it shall, at its discretion, give notice thereof, in writing, to the county attorney of the county in which said penalty or forfeiture has occurred, and upon receipt of such notice the county attorney shall prosecute the defaulting person or persons.

[Approved Feb. 23, 1889.]

THE HEATING AND VENTILATION OF THE STATE HOUSE.

The following letters in relation to the heating and ventilation of the State House are self explanatory.

PORTLAND, May 24, 1889.

Dr. A. G. Young, Secretary State Board of Health:

DEAR SIR—The matter of the ventilation of the State House is an important one to the State Board of Health. The amount of suffering in the old building has been immense, and it has not been at all infrequent that I have been asked: "Can't your Board of Health devise something that will give relief?" The people seem to connect us more or less with the sanitary arrangements of the State institutions as well as an advisory Board upon local nuisances, etc., and rightly so, I think, as this is the practice in other States.

While we consider ourselves experts, and possibly specialists upon certain lines, it is all the more important, especially in a matter so intricate as good ventilation, that we guard ourselves from errors.

The new building itself is only ordinarily difficult to arrange for, but to plan in a manner that the old part may be provided for by the new plant, as would be the part of wisdom, requires the service of a specialist. I consider it unsafe to be guided by an interested advocate of this or that system.

Professor Woodbridge is a specialist who knows the law under which good heating and ventilation may be had and would be capable of advising the State as to the system and its modifications that is applicable to the conditions to be met with. His opinion would not be warped by interest, and his experience and acquirements make him a valuable man.

I think we should urge the Commission to send for him before deciding upon any particular scheme.

Yours truly,

E. C. JORDAN, C. E.,

Member of State Board of Health.

MAINE STATE BOARD OF HEALTH,
AUGUSTA, May 25, 1889.

The undersigned Standing Committee on Ventilation of the State Board of Health would respectfully make the following recommendations to the State House Commissioners on the heating and ventilation of the State House.

1. The adoption of a system of heating and ventilation in which the warmed air is forced into the building and the various rooms by means of a fan.

2. The employment of a specialist to advise in regard to the plans and specifications for the application of such a system of ventilation.

3. The choice of Prof. S. H. Woodbridge of the Massachusetts Institute of Technology as such specialist.

O. A. HORR, M. D.,
E. C. JORDAN, C. E.,
A. G. YOUNG, M. D.,
Committee on Ventilation.

In accordance with the recommendations of the Committee on Ventilation of the State Board of Health, the State House Commissioners sent for Prof. Woodbridge to confer with them and advise in regard to the heating and ventilation of the building. The following report was subsequently made by him to the Governor, as chairman of the State House Commissioners:

MY DEAR SIR:—I beg leave to present a re-statement of my opinion, informally rendered before the commissioners on Friday of last week, in regard to the heating and ventilation of the capitol. In the absence of any definite statement, either as to the nature of the plans which had been previously proposed, or as to the amount of ventilation it was desired to effect, I gave the time available before meeting the commissioners to a study of the present capitol building and also the plans of the extension.

AIR SUPPLY REQUIRED.—All the rooms requiring ventilation may be classified under three heads: offices, committee rooms, and assembly rooms. To insure freshness of air in offices, including the library, I advise an air supply equal to their cubic contents once in twenty minutes. For the committee rooms I assume that provision should be made for a maximum attendance of from twenty-five for the smallest to fifty for the largest rooms, and I place 1000 cubic

feet of air supply per capita an hour as the limit of safety for these rooms when full, if the danger of draughts is to be avoided. The larger per capita space in the assembly rooms makes it safe to put the rate of supply at 1500 cubic feet for each occupant per hour.

Seventeen rooms in the extension require continuous ventilation, and during the sessions of the legislature nine committee rooms in the extension require ventilation, while the legislative halls are not in use, and vice versa. Adding to these such rooms in the present building as may be continuously used or devoted to committees, the air volume which a ventilating system including the entire and completed capitol should be capaple of supplying, may be stated thus: (a) for continuous ventilation, 500,000 cubic feet per hour; (b) for committee rooms, 450,000 cubic feet per hour; (c) for assembly rooms, 1,050,000 cubic feet per hour; or, since (b) and (c) are used alternately, 1,550,000 cubic feet per hour.

METHOD OF SUPPLYING THE AIR.—Such a volume of air can be moved through ordinary wall flues without mechanical assistance only when the conditions of weather and of working are exceptionally favorable—as in very cold weather and by the use of large and short course flues. But the system must be able to move the air demanded though the most unfavorable conditions of weather during which artificial ventilation is called for. The general character of the building and the impractibility of carrying vertical flues of sufficient size through its interior walls for ventilation by natural currents, make the use of mechanical means advisable, if not imperative. The simplest, most effective, and economical mechanism for moving air for ventilation purposes is a properly adapted fan. The fuel required to run it is very small, if steam is used, and the exhaust steam is passed into the heating system. Furthermore, the use of a fan, because of its effect in producing rapid movement of air over the steam pipes, and the resulting increased rate of steam condensation within them, may so reduce the needed amount of heating surface as to affect a saving more than enough to meet the cost of the fan.

THE VACUUM AND THE PLENUM METHODS.—The Vacuum method effects a movement of air into a room by creating a partial vacuum within it. The air then flows into the room through every available channel, both provided and accidental. Just as air supplied to a room under slight pressure will find its escape in large quantity from the room, though sealed as tight as putty, paint, paste and

paper can seal it, so outside air will as freely leak into such a room when a vacuum condition is maintained within it. The undesirable results are several.

1. The inward leakage of cold outside air, settling to the bottom of the room, tends to produce a chilly floor. This in turn makes it necessary to heat the air of the room sufficiently high to bring the temperature of the floor up to the point of comfort, or a superheating of the air in the upper part of the room for the sake of comfortable warmth in the lower part. This results in a greater temperature difference between the ceiling and the floor than would exist without the inward leakage of cold air. That is, the chilly floor necessitates the maintaining of a higher mean temperature within the room for the purpose of raising the floor temperature to the point of comfort than would be otherwise required. The consequence is an increased consumption of fuel over that which would be required were the temperature uniform from floor to ceiling. This defect with the exhaust method is identical with that peculiar to and inseparable from the use of the old fashioned fire-place. It is the more defective as the climate in which it is used is colder and the maintained vacuum greater.

2. Another result attending the use of the vacuum method is that, unless all outlets including fire-places, etc., are connected with the exhaust system, the vacuum condition within the room tends to retard and to reverse the desired flow through such flues. Fire-places are more likely to smoke, and the action of other independent flues to be weakened or reversed.

3. The source of a room's supply is not as completely under the control of the occupant as in the plenum method. The air moves from a greater and toward a lesser pressure. From whatever point, therefore, the pressure may be greater than in a room ventilated by a vacuum method, from that point it will move toward the room. A reduction of the vacuum, or what is the same thing, an increasing of the pressure in adjacent rooms or parts of the building, as by the opening of windows or the shutting of the exhaust flues taking air from them results in air movements toward the room in which the vacuum is maintained. Each room is therefore, more or less at the mercy of its surroundings, and of conditions beyond the control of its occupant.

4. Inrushing air is felt as a current by those within a room very much more than an out-rushing current of the same volume. An

in-rushing current is concentrated in volume, diverging slowly, and maintaining its high velocity to a considerable distance from the point of inlet. An out-rushing current, being strongly convergent toward the outlet in its movement from every possible point of approach, becomes sensible as a draught only on near approach to the outlet.

Because of the relatively large volume of air to be moved through an audience room, and the necessary energetic action of the exhausting apparatus, the vacuum within it is generally greater than that in corridors or rooms outside it, when the ventilation is by other method. The opening of doors into the corridors or lobbies is then attended by an in-rush of air.

The Plenum method of ventilation on the other hand, puts each room under a slight pressure, and retards or prevents inward leakage of cold air, and renders more possible that uniformity of temperature within a room which is essential to the highest economy in the use of heat: it tends to accelerate rather than retard the flow of air through other vents, including fire-places, etc; it gives an occupant of a room control over the source of his air supply; and it results in an outward flow through open doors.

For these reasons I have no hesitation in recommending the Plenum rather than the vacuum method for your use in the proposed ventilation of the capitol.

The vacuum method is as much better for certain kinds of work as is the Plenum for others, as in the production of concentrated ventilated draughts through hoods, etc., or in giving direction to slowly moving air freely supplied to a building for distribution by means of corridors, stair wells and open doors. The greater vivacity sometimes attributed to air supplied by the vacuum method, if it exists at all, may be due in part to the process going on within the room of the mixing of cold inward leakage with the warmer air of the room. Monotony is as depressing as variety is refreshing. Uniformly warmed and quietly moving air at 70 degrees will doubtless have a different and less pleasing effect than bodies of air at 65 degrees and 75 degrees imperfectly mixed and in active movement. The depressing effect said by its opponents to be inseparable from Plenum ventilation is, however, more likely due to the faulty way in which the air supply is heated.

Method of Heating.—If a room is heated by the ventilating air, it can be heated only when ventilated. To heat the room the air may be supplied either in large volume at low temperature, or in small

volume at high temperature. If a large air supply is wanted, its temperature must be low; and if the supply is small, its temperature must be high. Such a variable range of temperature requires special means for effecting it, either a dual system of supply by which hot and cold air can be mixed in such quantities as may be required for each room, or else a separate supplementary indirect heater for each room with by-pass arrangement.

Besides being somewhat cumbersome and expensive, these methods have still the failing that heating is dependent on ventilation to a greater or less extent. By the most efficient means heating can doubtless be done more cheaply by the direct than by the indirect method, since ventilation, by the very movement of warm air out of a building, carries heat with its discharge. Since during the session of the legislature, the committee rooms, the assembly halls, etc., are to be kept continuously warm, and need ventilation but one-half the time, and no ventilation except when the legislature is in session, and as their ventilation must vary with the number using them, I would recommend the distribution of air warmed only to seventy degrees or so to all rooms to be ventilated, and the placing of direct radiators within the rooms to furnish the supplementary heat required, the steam to be admitted to the radiators by such automatic means that the temperature of the room shall be kept at the desired point. Then, when the room is empty and the air supply small, or entirely shut off, the duty of heating will fall on the radiators; and when the room is crowded and the air supply large, the steam will be automatically shut off from the radiators.

All things considered, this is the most perfect arrangement I am able to suggest.

For the ventilation of the Hall of Representatives I would recommend that the supply of air be passed through the floor, and its slow diffusive movement into the room be effected through a large surface to be obtained by a special adaption of either the members' desks or the chairs to the purpose. The discharge I would effect through some suitable opening in the dome and by large outlets over the galleries and thence through the attic and dome and lantern.

Without further study of plans and conference with the architect, any detailed statement of method is impossible. In general it would include a fan in the basement with 1,000 square feet of steampipe heating surface, an air duct running along the ceiling through the corridor of the extension basement, with branches to

the flues in the corridor walls, and another air duct running to the basement corridor of the old building with large branches to the Senate and Representative halls, and smaller ducts to other rooms to be reached. The discharge would be by means of suitably sized flues in the corridor walls of the extension and by fire-place flues, and such other ducts as might be found necessary in the building, all ducts being properly carried up and terminated in the roof.

For extreme weather (–20° F.), for which the system must be provided, and when the system is doing full duty the coal combustion for warming the ventilating air will reach 250 pounds per hour, and the grate area provided for this purpose alone should be about 25 square feet. For heating the extension, aside from the ventilation of both the buildings, some 20 square feet of grate should be provided. This is found to be considerably more than double the present boiler power. The chimney should have a sectional area of 9 square feet for the total area of grate required.

The cost of using the proposed ventilating system to its full extent in mean winter weather would be from ten to fifteen tons of coal per month, or eighty tons if the system were so used continuously from the first of October to the last of May.

A rough estimate of the cost of fan, engine, steam heating surface, and return pumps to boiler, and large air pipes, for the vents of the entire building, is $2,200. For supplementary steam heating surface, vent pipes from top of wall and other flues to and through the roof, register faces, etc., $2075. For automatic electric apparatus for the control of steam to radiators, $1000. This does not include boilers and extra cost in refitting the Senate and Representative halls with new or altered desks, or chairs, etc.

If provision is to be made for the extension only, the estimate would be considerably reduced.

DOUBLE TUBE RADIATORS AND VENTILATION.

The use of these radiators, in connection with an exhaust method of discharge, removes none of the objections already mentioned as inhering in the vacuum method of ventilation. Its use as a means of supply is, in some important respects, faulty. Area of inlet, or quantity of supply, can be had only by correspondingly increasing the heating surface. For an audience room, small or great, such as committee or assembly rooms, the required inlet area can be had only by an accompanying excess of heating surface, and that where heating surface is least needed. In a crowded room, even in severe

weather, the heat of the audience is often more than sufficient to maintain a comfortable temperature, if the air supply is passed in at a temperature of only seventy degrees. But, under unusually favorable conditions, these radiators require two tubes per occupant for supplying air, and they are reported by their maker to so increase the temperature of the air flowing over them as to raise its temperature from sixty degrees to eighty degrees. In warmer weather—when more air is required at yet lower temperature than in cold—the supply through the tubes will be less in quantity and at a higher temperature. The larger the hourly air volume used, or the more rapid the change of air within a room, the lower must be its temperature, if it is the vehicle of heat also, and the warmer the outside air the less the temperature increment in the supply must be. The method of ventilation by double tube radiators seems therefore, faulty in principle and defective in the flexibility of its adaptation to the varied requirements a ventilating system is called on to meet.

Furthermore, the passing of air into rooms through wall apertures is not to be recommended, and for reasons among which are the following: Each aperture must have its valve to be opened and closed each day. Each of the thirty odd rooms in the extension would require for the purpose of ventilation, if not of heating, from one to three or more inlets, or the manipulation of from fifty to sixty dampers twice a day when all the rooms are in use. The almost inevitable tendency will be to a disuse of the dampers through the indifference of occupants and janitorial neglect, and the danger of exposure to freezing through either or both of these causes will be large and, perhaps, welcomed by a neglectful janitor as reasons for their permanent closing. The most serious objection to the use of wall apertures for supply is to be found however, in the disturbing, interfering and fitful action of the wind, forcing in excessive volumes of underheated air on the windward side, and not infrequently forcing out warm air on the leeward side, the system which is least disturbed by wind action is that of internal supply, and especially that whose motive power is independent of wind and weather.

Respectfully submitted,

S. H. WOODBRIDGE.

To His Excellency the Governor, HON. EDWIN C. BURLEIGH, *Chairman of the Board of State House Commissioners, Augusta, Maine.*

BOSTON, June 8, 1889.

A little later in June a special committee of the Commissioners, consisting of Hon. Lewis Barker and Hon. Henry Ingalls, accompanied by the Secretary of the State Board of Health, visited Boston and examined various systems of ventilation there employed. After a careful examination of the questions involved, this committee recommended to the full board of Commissioners, the adoption of such a system of ventilation as Prof. Woodbridge had already advised in a general way, and he was employed to draw up the full plans for this part of the work on the building.

CONTAGIOUS DISEASES.

The condition of the State as regards the prevalence of the infectious diseases, small-pox, diphtheria, scarlet fever and typhoid fever within the year has been very satisfactory indeed, with the exception of a very few towns, as may be gathered from a cursory examination of the reports of the local boards of health. In the following instances towns have been visited, on account of outbreaks of infectious diseases, by the Secretary or other members of the Board:

But one case of small-pox occurred, a case of varioloid at Readfield. Its origin was wholly unknown, though the patient, a young lady, had been to Portland in the cars ten or twelve days before the attack. She was isolated in her own home, the rest of the family were vaccinated, and there was no spread of the infection.

There has been a smaller number than usual of outbreaks of diphtheria, scarlet fever, and typhoid fever, uncontrolled and assuming alarming proportions. The Secretary went to Jonesport in July where diphtheria had been prevalent for some time. Considerable complaint had been made in the town, partly, that the local board of health did not do enough, and partly, that it did too much, meanwhile there was not so much disposition shown as there ought to have been, to put the shoulder to the wheel and help and encourage the Board, and the afflicted families.

In April, scarlet fever broke out among the students of the seminary at Kent's Hill, Readfield, and, unfortunately, the first cases were not isolated so promptly as they should have been. The result was an outbreak of moderate proportions which spread the disease to some other towns. In the fall another outbreak of the same disease occurred in the same institution and was confined to the first two cases by prompt and praiseworthy action on the part of the

local board of health and the school officers. Meanwhile the school continued its course without interruption.

In May, the Secretary was called to Winthrop on account of a small outbreak of scarlet fever. The disease was confined to a single family, but the father worked in the neighboring mill where many other persons worked, thus incurring the danger of spreading the infection broadcast. A talk was had with the man, and he agreed to remain isolated with his family. No new cases occurred until after the release from isolation when cases occurred in the family of a relative.

A small outbreak of typhoid fever occurred at Green's Landing, Deer Isle, due to bad water. The soil is thin and the wells as a general thing, go down to the underlying granite ledge and take their water from its surface, and as the privies and house drainage are, in many cases much too near, the conditions are extremely favorable for the soakage of polluting or infectious matter into the wells. A new water supply taken from outside the village is much needed.

Fairfield was visited by Dr. J. O. Webster, on account of typhoid fever in a tenement house, and another outbreak of the same disease in a similar institution, was seen by Dr. O. A. Horr. In both instances the outbreak seemed to be due to faulty sanitary arrangements.

INSPECTIONS OF SCHOOL-HOUSES.

North School—Portland.

The city authorities, having made a praiseworthy attempt to remedy some of the evils connected with this building, described in the Third Annual Report, invited the members of the board to inspect their improvements on December 27, 1889,—but only Drs. Webster and Smith were able to be present. It was found that the schools were not in session at the time, so that no examination of the condition of the air was possible. The heating apparatus, however, was in operation, so that some measurements of the air supply could be made; but as the fires were only started that morning, it was thought that the results might not be equal to those ordinarily attainable,—therefore Dr. Smith was requested to make further examinations, when the schools were in session. The improvements

made concerned only the heating and ventilation, and are well described in the following report of Dr Smith. For its better understanding, it may be said that an air movement of 500 ft., a minute through the inlets, or 200 ft. a minute through the outlets, would represent an air supply of 1500 cubic feet an hour for each pupil, at 40 pupils per room, a very satisfactory amount.

We were sorry to find that the privy arrangements connected with this building were in the same deplorable condition that was described two years ago. We hope to hear ere long, that this nuisance has been abated.

Dr. Smith's report is as follows:

PORTLAND, February 14th, 1890.

Dr. A. G. Young, Secretary State Board of Health of Maine:

DEAR SIR: In accordance with your request, on Monday, January 13th, I visited the North school-house in this city and made an examination of the provisions for ventilation and have the honor to submit the following report:

Air Supply: Fresh air is admitted to the rooms through registers 6x20 inches in the window seats, being taken through an aperture in the outer brick wall 5x26 inches, which may be closed by a shutter, pivoted in the middle at each end, and manipulated by a chain passing up over the sills and into the room through a groove in the bottom of the sash. There are two of these apertures for each room. The cold air thus admitted comes in contact with a "Goldpin" radiator, situated immediately beneath each window seat, and having an area of 40 square feet of heating surface at each window serving or intending to serve the double purpose of inducing more draft through the inlet and warming the admitted air.

Each of the two windows in each room, has in its seat a register surface of 120 square inches, allowing a deduction of one-third for the iron lattice work, there would be for each window an inlet aperture of 80 square inches and for the room 160 square inches.

The "Goldpin" radiators beneath the window seats are not enclosed, but are in a space cut out of the wall communicating freely with the out door air through the 5x20 opening, and with the spaces in the walls and beneath the flooring. This space is separated from the school-room only by sheathing which forms the wainscotting of the rooms. As near as may be estimated the space beneath each window is about 30x18x24.

Air Outlet: Provision has been made for removing the vitiated air from the rooms by brick flues, each taking the air at the floor level through a coarsely grated aperture 19x35 inches square, and leading directly to the roof parallel and adjacent to the chimneys which are in the center of the wings. Each room has an independent flue, making in all twelve, which terminate by galvanized iron tops, surmounted by a hood 9 inches above them. The chimney flue passes directly through the hood, and three or four feet above it.

The method depended upon to create a current in these flues is different in the north and south wings.

Those in the north wing next Congress street are provided with steam pipes running up from 25 to 30 ft. above the attic floor.

Those in the south wing next Federal street have no steam pipes but depend upon the heat from the smoke flue of the chimney from which they are separated by a brick chimney wall.

On the occasion of my visit, the temperature out of doors was 30°, wind northeast, light, and weather foggy with drizzle of rain. Every one of the twenty-four rooms was examined with the following results.

North Wing—1st Floor: Air was entering each room at an average rate of 450 feet per minute, through *two* registers, each of an area of 120 square inches (no allowance made for lattice work.)

Air was leaving each room through one outlet of 665 square inches at an average rate of 268 ft. per minute.

The temperature of the rooms was uniformly 70°. The air was tested for CO_2 in two of these rooms on the side next the wind with a result of 12.5 per 10,000 for one, and 11 for the other. The average number of scholars for each room when all were present would be 34. The average of those present was 22, many being absent by reason of the prevailing influenza.

	Average velocity at inlets. (2)	Average velocity at outlet. (1)	Temperature.	Proportion of CO_2 in 10,000 pts. of air.	Average attendance.	
North Wing, 2d Floor ..	421	221+	70°	12—one room.	35 to 40	Flues with steam pipes.
North Wing, 3d Floor .	450	143+	70°	10, 11, 14	38 to 40	
South Wing, 1st Floor ..	491+	253+	70°	-	35 to 40	Flues with no steam pipes.
South Wing, 2d Floor ..	475	201+	70°	16	35 to 42	
South Wing, 3d Floor ..	450	191+	70°	11	25 to 42	

It was stated to me by the janitor that in all four flues in the north wing there was 1200 feet of 1-inch circulation.

The steam for heating is furnished by 2 boilers each 3ft. 6 in. by 16 ft.

With the temperature at 0° from 4 to 5 lbs. are required to maintain the temperature of the rooms at 70°. In ordinary weather 2 lbs. suffices.

A few days later I was requested by the mayor, Hon. H. M. Melcher to make a further test of the south wing inasmuch as there had been no fires in the building during the Saturday and Sunday preceding my visit, and the flues in the south wing had not received the benefit of the heat.

February 14th I again visited the school with the following result:

South wing.	Average velocity at inlets. (2)	Average velocity at outlets.	Temperature.	Proportion of CO_2 to 10,000.	Average attendance.	Temperature out of door, 30°; wind, S. W. fresh air moist.
First floor...... (on N. E. side.)	2 rooms. 470 2 rooms. 153+	2 rooms, N. E. side. 157+ 2 rooms on windward side had a strong downward draft—135 feet, the other 75 feet. One could feel cold air about the floor.	70°	10.0	38	Each number in CO^2 column represents one room.
Second floor....	470	141+	70°	14.0 12.5 14.0 10.5	40	
Third floor.....	450	131+	70°	12.0	40	

The air in most of the rooms was perceptibly close and ill-smelling, and in several, windows and doors were found freely open. This is constantly necessary (said to be done by reason of heat) and it is usually necessary to place large card-board charts in front of the exit apertures to keep from the floors strong downward currents, especially in those rooms next the wind.

While the system employed is by no means perfect or most desirable it has secured a vast improvement over the condition of affairs

existing before its introduction. The committee in charge of the matter seem to have done the best they knew with the sum of money placed at their disposal by the city government. It is a matter of regret that the "Goldpen" radiators could not have been enclosed in galvanized iron boxes, and that the flues which diminish in size for each floor toward the roof, could not have been larger and those in the south wing provided with steam heat. What the system will accomplish in weather without the aid of artificial heat is conjecture. Doubtless it will have to be supplemented by open windows.

I send you card diagrams showing the exact rate of exit for every outlet in the building. The inlet rate is very uniform. The attendance in January did not average over two-thirds or three-fourths of the number belonging to each room. In February it was nearly up to the normal.

Very respectfully submitted,

CHARLES D. SMITH.

OAK STREET SCHOOL—LEWISTON.

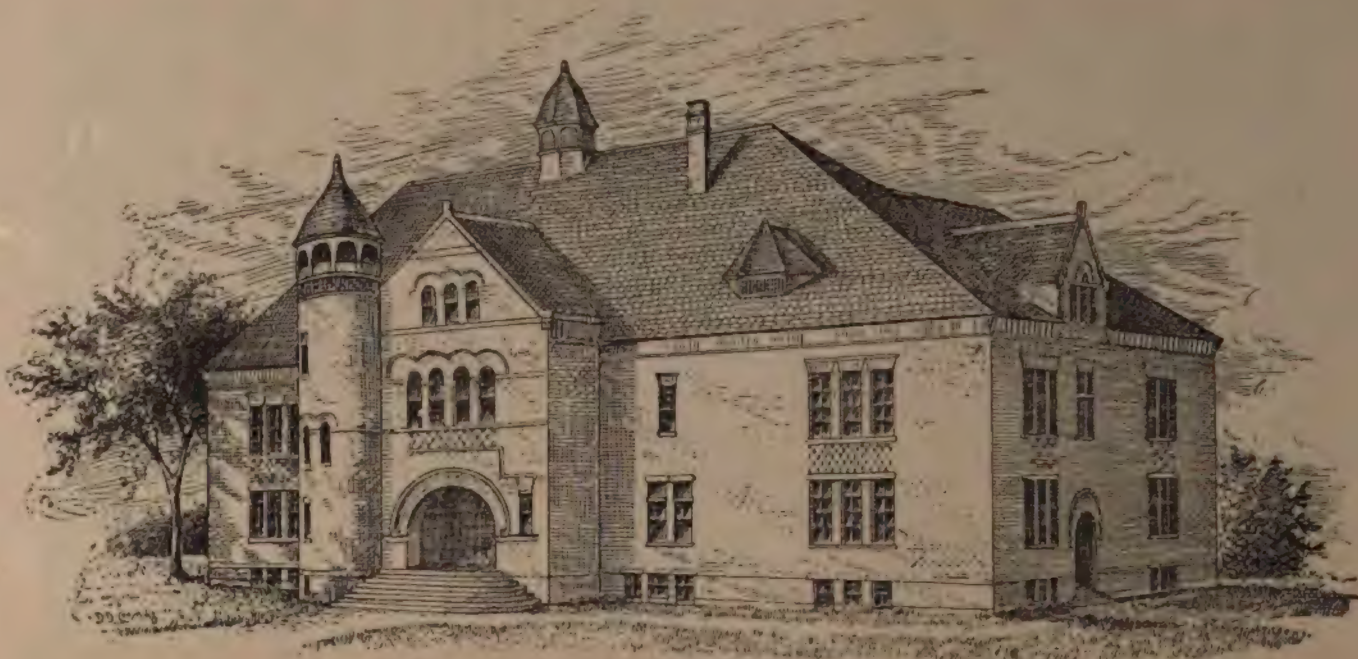
The report on the examination of the building was made by Dr. J. O. Webster, member of the Board:

On the 7th of January, 1890, several members of the Board visited Lewiston, for the purpose of inspecting the new Oak street school-house, with special reference to its arrangements for heating and ventilation.

In these respects the city authorities have made a praiseworthy attempt to attain the best possible results,—an attempt that cannot be said to have conspicuously failed, neither to hav. met with perfect success.

The credit is due to them of having, first in this State, applied to a school-house an apparatus for mechanical ventilation,—the only method of ventilation that can be depended upon for exact results and is independent of wind and weather; and whatever criticism we find it our duty to make upon the details of the work, should not detract from the credit due its inception.

This is a fine specimen of school-house architecture, and the arrangement of its rooms and its general hygienic condition are unexceptionable. The basement is high and airy, and contains, instead of separate water-closets, one of the forms of school sinks, with an automatic flush-tank; the boys' urinal is of slate slabs with



OAK STREET SCHOOL—LEWISTON.

constantly flowing water; the closets are ventilated, the soil-pipes are properly arranged and all traps are ventilated; in short, we found here a model job of plumbing.

Especially worthy of notice in this connection are the toilet sinks for pupils, with soap and towels, in the corridors, and the toilet-rooms for teachers' use.

There are ten school-rooms, each 23x33ft., and of proper height. Each room is lighted by six windows, each containing eight lights of 18x22 glass, giving a glass surface equal to one-sixth the area of the floor, just the proportion that is considered most desirable. In two rooms the lighting is from the left alone, in eight from the left and rear of the pupils.

All the school-room windows are double, both outer and inner sashes sliding up and down. This is an important point in school-house architecture in our climate. It will be seen that it is a very fortunate arrangement for this house.

The school-rooms are heated by radiators with double tubes; the inner tube being open at top and bottom to allow the air to pass through, the outer closed and containing the steam.* An opening through the outer wall of the building below the floor level, conveys air to the bottom of each radiator, in passing through which, it becomes heated and enters the school-room. There are three radiators in each room. The area of each air inlet is 36 square inches, or 108 square inches per room; and we found the air entering them at an average rate of 300 feet a minute. This is probably as great velocity as it is practicable to get, and is the maximum rate at which it is considered advisable to allow air to enter an occupied room. A little calculation will show that, at this rate, 13,500 cubic feet of air an hour will enter each school-room through these openings. As this is only one-fourth or one-fifth the needed amount, it is not surprising that the teachers had found practically—what our measurements demonstrated scientifically—that it was necessary to keep the windows constantly open. By dropping the inner sash at the top and raising the outer at the bottom, this could be done without inconvenience in the mild weather that had prevailed.

Turning to the ventilating apparatus proper, we are able to commend it in the highest terms. At the bottom of each room are three ventilating registers each of about one square foot available area. From each of these a galvanized iron pipe leads to the attic

* See "Double Tube Radiators," page 14.

where the pipes gradually unite and finally all combine into a five foot pipe, containing a five foot fan which drives the air into a ventilating tower above the roof. The fan is run by a water-motor. It was making 252 revolutions a minute and drawing the air through the ventilating registers at the rate of 200 feet a minute. It was, however, easily run at a speed which gave a rate of 300 feet a minute through the registers. At the latter rate it affords very good ventilation; but at the former it is very deficient, as shown by the analysis made of the air in a primary room, which showed ten parts of carbon dioxide per 10,000. By closing the windows and doors of any room, leaving a chance for the air to enter only through the radiators, the rapidity of its exit was much reduced.

We conclude, that if the fan be run constantly during school hours at such a rate as shall maintain a flow through the ventilating registers of 300 feet a minute, the rooms will be very well ventilated—that with the present arrangement of inlets, it will be necessary to take a part of the air supply through the windows—that to make the system perfect, the ventilating apparatus should be complemented by some form of heating apparatus that would supply to each room, 50,000 to 60,000 cubic feet per hour of *warmed* air whenever heat is needed—not *hot* or partly hot and partly cold.

In warm weather, the fan run by a water-motor has a great advantage over the systems of ventilation dependent upon heated flues or a motor run by steam, because it can be kept running when heat is not needed, and will insure a proper change of air at the time when, from the slight difference between the external and internal temperature, natural ventilation is least efficient. Therefore the fan should be run when school is in session, all the year round and not simply when artificial warmth is necessary.

While in Lewiston we visited, by request of the committee, the other principal school-houses in the city.

The Bates street house is in an equally bad condition as when reported on two years ago,—it is inefficiently warmed by furnaces, has no proper ventilation, and the water-closets in the basement are abominable. It should be heated by indirect steam radiators, sufficient to furnish an air supply, supplemented by direct radiation for additional heat if needed. At the same time, some steam pipe

should be put into the ventilating flues to cause an upward draft, and new flues should be added. About the same can be said of the Grammar school-house, except that it is already heated by direct steam,—it should be supplied with sufficient indirect radiation and ventilation. Both of these buildings should have new water-closets or school-sinks at once, and all their plumbing should be thoroughly overhauled. They are in a very unsafe condition at present.

The Main street school-house is in excellent condition and a credit to the city; is nearly new and is in many respects a model building; but it suffers from the same entire lack of air supply and ventilation—a lack with which the High school-house is also afflicted. We hope the work begun this year will be continued until Lewiston can point with pride to all her school-houses.

North Grammar School—Waterville.

Dr. Webster of the Board, visited Waterville on February 11, 1890, and inspected the North Grammar school building—a new school-house erected some two years ago—and reports as follows:

This is a two-story brick school-house containing eight rooms, four on each floor, with large cloak-rooms adjoining, and spacious halls. It would well serve as a model for school buildings of this size.

Each school-room is 28x35 feet, twelve feet high. The windows are 36x76 inches glass surface. Two rooms have five windows on the left, the others four on the left and two in the rear. The glass surface is below the standard; though on the day of my visit, the lighting was satisfactory. Each room has a door opening into the hall and one into the cloak-room, both with transoms over them; and from each cloak-room there is also a door to the hall.

In the basement are short-hopper water-closets with a very fair flush, worked by the seat—not the best of closets, but kept in good condition by great care. On the boys side are slate-slab urinals with constantly running water. An abundant supply of umbrella racks is found in the dry, light and well cemented basement.

The heating is by steam with indirect radiation for air-supply, supplemented by direct for additional heating when needed. The indirect radiator boxes, air-supply pipes and hot-air flues are of galvanized iron, separate for each register.

The inner corner of each school-room is cut off, and the hot-air and ventilating flues run in the space thus formed. The warmed

air enters near the top of the room, through a register 12x18 inches. The ventilating register of the same size is near the floor. In the cloak-rooms, on the contrary, the hot-air register is in the floor, the ventilating register at the top of the room.

From each ventilating register a galvanized iron pipe leads directly to the attic where all enter a wooden box, six and one-half feet square and about the same height, situated under, and opening into the cupola which rises from the center of the roof. This box has three runs of one and one-half inch steam pipe around it on the inside, to create a current in the ventilating pipes.

Careful measurements were made of the air-flow in four of the rooms,—two on each floor; and it was found pretty uniform.

The average in-flow of warmed air was 520 ft. a minute, which would give some 45,000 cubic feet of air an hour to each school-room. The rates as measured at the outlets were considerably less; but as no more air can enter a room than goes out, and *vice versa*, the larger number represents the amount of air actually supplied. If the doors between school-room and cloak-room are kept open, considerably more air—perhaps nearly twice as much—is available; for each cloak-room has the same air supply as a school-room.

For want of time, the air could be tested in but two rooms, and that just before noon. In one, with all doors, windows and transoms closed, the CO_2 rate was 9.5; in the other, which had the door into cloak-room open, 8.3 per 10,000. The temperature was very uniform, ranging from 70° to 74° in the center of the room. There are, on an average, about 40 pupils in a room.

The results here attained are so far superior to those found, as a rule. in our best school-houses, that we feel like bestowing only praise; and while, in future building, we should recommend an increased area of air-inlets and outlets in the school-rooms, we consider the conditions here highly satisfactory.

New Mills School—Gardiner.

On the 12th of the same month, Dr. Webster also visited Gardiner, and reports as follows:

The new school-house erected the past year at New Mills, Gardiner having been reported to be a model in respect to heating and ventilation, it was thought best to ascertain, by inspection, the truth of these reports. It is a two-story wooden school-house, of quite a pretentious outside appearance. The halls are spacious, stairs wide with

short runs, two cloak-rooms to each school-room open from the hall, and entrance to the school-rooms is only to be gained through these,—this part of the building is admirably arranged.

On entering a school-room, however, disappointment awaits one. The rooms are some 32 ft. wide, 30 ft. deep, and 12 ft. high, being much too wide for their depth. The lighting is from three sides, by 16 windows, 12 lights, 9x18 inches, six on each side and 4 in the rear. The heating is by direct steam, 4 runs of circulation pipe along the three outer walls. There are no air-inlets, and no attempt at an air supply. There are ventilating registers behind the teacher's desk, opening into flues in the chimney that carries the smoke-flue from the boiler. The lower registers are 11x15 inches. There are upper registers, for hot weather, now properly kept closed.

The rate of outflow was through register on first floor, 145 feet, on second floor, 230 feet a minute, carrying in the former case about 8,700 and in the latter 13,800 cubic feet of air an hour. The doors have to be kept open to supply fresh air. The air was tested in the lower room just after recess and found to contain 8.3 CO_2 per 10,000. With the doors closed it must soon become very foul, as is said to be the case.

It would be very easy to furnish an air-supply for these rooms by putting two indirect radiators into the cellar with about a sixteen inch supply and hot-air pipe to each, one of the latter opening by a large register into each school-room at some convenient place. Then if the ventilating flues be not efficient they can be heated by coils of steam-pipe. It is unfortunate that the windows on the pupils' right were not omitted a part of them being added to those on the left and in the rear. With the changes indicated, this would be—what it is not now—a healthful school-house.

We are glad to know that the architect was not responsible for these faults. His plans provided for just the things that we suggest, but they were well-nigh spoiled by the ill-advised changes made by the building committee.

CIRCULARS.

The following new circulars were published within the year. Circular No. 53 was written at the request of the school officers of several towns. The advance of our knowledge regarding the causes and possibilities of preventing that most destructive of all diseases,

consumption, made the publication of Circular No. 54 a necessity. It is believed that a wide diffusion of the information which it contains would result in the saving of many lives every year.

CIRCULAR No. 53.

STATE BOARD OF HEALTH OF MAINE.

CHARACTERISTICS OF THE INFECTIOUS DISEASES.

The purpose of this circular is to set forth, for the use of teachers, school officers, and non-medical members of local boards of health, the principal characteristics of the infectious diseases and of their infection, and to give brief hints in regard to preventing their spread.

Note of Definition.—The *period of incubation* is the time which elapses after the reception of the infection until the first, or premonitory symptoms occur. *Period of invasion*, time from the first symptoms until the disease is declared, or, in the eruptive fevers, till the appearance of the eruption. *Vesicle*, an elevation of the cuticle containing clear watery fluid. *Pustule*, same as "vesicle" excepting it contains pus or colored serum.

Chicken-pox. Period of incubation, 13-14 days, may be shorter or may be prolonged to 18 or 19 days. Period of invasion very short. A disease of childhood, but occasionally occurring in adults. The eruption consists of clear watery blisters or vesicles, scattered irregularly over the body. The eruption is often the first thing noticed. Premonitory symptoms are often overlooked as also are often the small red spots preceding the vesicles. The "blisters" reach their full development in 24 or 36 hours. Successive crops of vesicles and unequal development of them on the same parts of the body. With the appearance of the eruption, the fever increases. (Compare small-pox.)

Consumption (Pulmonary Tuberculosis.) The investigations of the last few years make it certain that this is an infectious disease, and also make it likely that the only serious source of danger is the sputum, or expectoration. While the sputum is moist it is practically harmless; after it is dried, pulverized, and floated in the atmosphere, so that it may be inhaled, it is dangerous. Avoid, therefore, spitting upon floors, in handkerchiefs, or upon other things within doors, where the infectious sputum will be dried and pulverized. Use a spit-cup. Tuberculous or consumptive children

should not be allowed to attend school, and persons with this disease should not teach. (See Circular No. 54, Prevention of Consumption.)

Croup. Membraneous croup is now generally regarded as diphtheria of the air passages, and the same precautions are applicable to it as in ordinary diphtheria.

Diphtheria. Period of incubation 2–7 days, but may be longer or shorter. The distinctive feature of the disease is the false membrane which invades the mucous membrane, more frequently of the throat. The false membrane appears at first as a whitish patch, or there may be several such spots, which may gradually or rapidly increase in size and coalesce. The condition and appearance of the false membrane, as first discovered, may remain stationary for awhile, or gradually disappear. Occasionally in cases of diphtheria the false membrane is absent, or in localities where it is not to be seen. When diphtheria is prevalent, it is safer to regard all cases of sore throat as diphtheria, and to require a reasonable amount of care until they are pronounced non-diphtheritic, and non-infectious by a physician. "Diphtheritic sore throat" is diphtheria.

The diptheritic infection is much more dangerous to children than to adults. Many persons are not susceptible to it; and, on the other hand, articles and rooms infected with it may retain their dangerous qualities for a long while. Children who have had diphtheria should not be re-admitted to school earlier than three or four weeks after recovery, or not until precautions in the way of thorough disinfection, etc., have been taken which are satisfactory to the local board of health. The infection may be carried by those who have not had the disease. (See Circular No. 44, Diphtheria.)

Dysentery. Some forms at least of this disease appear to be infectious. The infection is undoubtedly given off in the discharges from the bowels, and it is often spread, as typhoid fever is, by the contamination of drinking water. Period of infection, said to be from 3–7 days.

Erysipelas. Infection usually gains admission to the system through a wound or abrasion of the skin or mucous membranes. The infection may be carried by the clothing, or the hands of attendants. The period of incubation is very short.

German Measles (Rotheln.) This eruptive disease has no relation to measles and scarlet fever with which it is sometimes confounded. Its period of incubation is long, two to three weeks.

It was stated to me by the janitor that in all four flues in the north wing there was 1200 feet of 1-inch circulation.

The steam for heating is furnished by 2 boilers each 3ft. 6 in. by 16 ft.

With the temperature at 0° from 4 to 5 lbs. are required to maintain the temperature of the rooms at 70°. In ordinary weather 2 lbs. suffices.

A few days later I was requested by the mayor, Hon. H. M. Melcher to make a further test of the south wing inasmuch as there had been no fires in the building during the Saturday and Sunday preceding my visit, and the flues in the south wing had not received the benefit of the heat.

February 14th I again visited the school with the following result:

South wing.	Average velocity at inlets. (2)	Average velocity at outlets.	Temperature.	Proportion of CO_2 to 10,000.	Average attendance.	Temperature out of door, 30°; wind, S. W. fresh air moist.
First floor...... (on N. E. side.)	2 rooms. 470 2 rooms. 153+	2 rooms, N. E. side. 157+ 2 rooms on windward side had a strong dow	70°	10.0	38	Each number in CO_2 column represents one room.
		strong dow	nward d	raft—	one	
		135 feet, t	he other	75 fee	t	
		One could	feel cold	air a	bout	
		the floor.				
Second floor....	470	141+	70°	14.0 12.5 14.0 10.5	40	
Third floor.....	450	131+	70°	12.0	40	

The air in most of the rooms was perceptibly close and ill-smelling, and in several, windows and doors were found freely open. This is constantly necessary (said to be done by reason of heat) and it is usually necessary to place large card-board charts in front of the exit apertures to keep from the floors strong downward currents, especially in those rooms next the wind.

While the system employed is by no means perfect or most desirable it has secured a vast improvement over the condition of affairs

existing before its introduction. The committee in charge of the matter seem to have done the best they knew with the sum of money placed at their disposal by the city government. It is a matter of regret that the "Goldpen" radiators could not have been enclosed in galvanized iron boxes, and that the flues which diminish in size for each floor toward the roof, could not have been larger and those in the south wing provided with steam heat. What the system will accomplish in weather without the aid of artificial heat is conjecture. Doubtless it will have to be supplemented by open windows.

I send you card diagrams showing the exact rate of exit for every outlet in the building. The inlet rate is very uniform. The attendance in January did not average over two-thirds or three-fourths of the number belonging to each room. In February it was nearly up to the normal.

Very respectfully submitted,

CHARLES D. SMITH.

OAK STREET SCHOOL—LEWISTON.

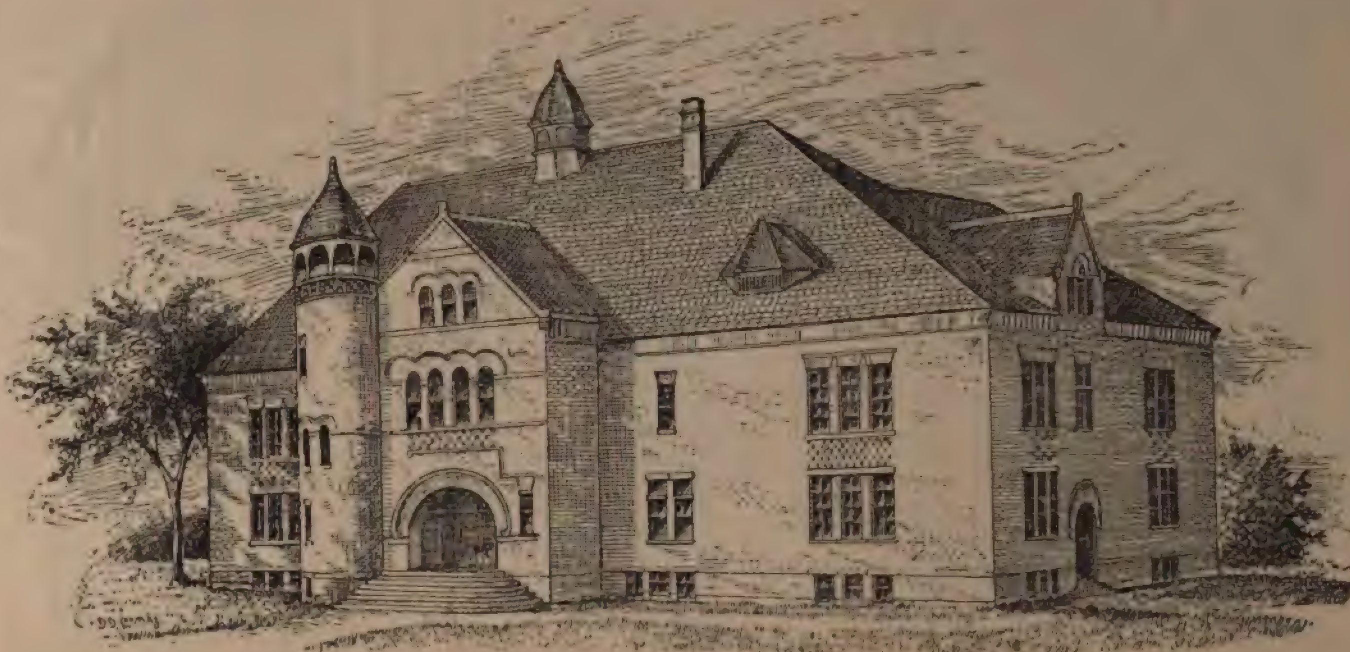
The report on the examination of the building was made by Dr. J. O. Webster, member of the Board:

On the 7th of January, 1890, several members of the Board visited Lewiston, for the purpose of inspecting the new Oak street school-house, with special reference to its arrangements for heating and ventilation.

In these respects the city authorities have made a praiseworthy attempt to attain the best possible results,—an attempt that cannot be said to have conspicuously failed, neither to have met with perfect success.

The credit is due to them of having, first in this State, applied to a school-house an apparatus for mechanical ventilation,—the only method of ventilation that can be depended upon for exact results and is independent of wind and weather; and whatever criticism we find it our duty to make upon the details of the work, should not detract from the credit due its inception.

This is a fine specimen of school-house architecture, and the arrangement of its rooms and its general hygienic condition are unexceptionable. The basement is high and airy, and contains, instead of separate water-closets, one of the forms of school sinks, with an automatic flush-tank; the boys' urinal is of slate slabs with



OAK STREET SCHOOL—LEWISTON.

constantly flowing water; the closets are ventilated, the soil-pipes are properly arranged and all traps are ventilated; in short, we found here a model job of plumbing.

Especially worthy of notice in this connection are the toilet sinks for pupils, with soap and towels, in the corridors, and the toilet-rooms for teachers' use.

There are ten school-rooms, each 23x33ft., and of proper height. Each room is lighted by six windows, each containing eight lights of 18x22 glass, giving a glass surface equal to one-sixth the area of the floor, just the proportion that is considered most desirable. In two rooms the lighting is from the left alone, in eight from the left and rear of the pupils.

All the school-room windows are double, both outer and inner sashes sliding up and down. This is an important point in school-house architecture in our climate. It will be seen that it is a very fortunate arrangement for this house.

The school-rooms are heated by radiators with double tubes; the inner tube being open at top and bottom to allow the air to pass through, the outer closed and containing the steam.* An opening through the outer wall of the building below the floor level, conveys air to the bottom of each radiator, in passing through which, it becomes heated and enters the school-room. There are three radiators in each room. The area of each air inlet is 36 square inches, or 108 square inches per room; and we found the air entering them at an average rate of 300 feet a minute. This is probably as great velocity as it is practicable to get, and is the maximum rate at which it is considered advisable to allow air to enter an occupied room. A little calculation will show that, at this rate, 13,500 cubic feet of air an hour will enter each school-room through these openings. As this is only one-fourth or one-fifth the needed amount, it is not surprising that the teachers had found practically—what our measurements demonstrated scientifically—that it was necessary to keep the windows constantly open. By dropping the inner sash at the top and raising the outer at the bottom, this could be done without inconvenience in the mild weather that had prevailed.

Turning to the ventilating apparatus proper, we are able to commend it in the highest terms. At the bottom of each room are three ventilating registers each of about one square foot available area. From each of these a galvanized iron pipe leads to the attic

* See "Double Tube Radiators," page 14.

not infectious, *and that the same may be said of the sputum so long as it remains moist.*

Another line of investigation has proved that *the careless consumptive patient is a focus of infection, and a danger to all persons who come much in proximity to him*, especially to those who dwell in the same rooms with him.

The reason of this is that the expectoration of the patient, spit upon floors, carpets, pocket handkerchiefs or clothing, becomes dried and pulverized and, floated in the air, still contains the infectious germs, and cannot be inhaled without great danger.

Though infection may be regarded as the principal, *the essential* cause of consumption, there are nevertheless various untoward influences which have much to do with increasing the death-rate from this disease, and should never be disregarded. The most important of these are the breathing of impure air, particularly that of unventilated sleeping rooms and living rooms, the use of food not sufficiently nutritious, and dwelling upon a soil that is damp.

How far heredity is a cause of consumption, is, from the nature of the question, hard to determine. Since the infectiousness of the disease has been shown, many family groups of consumption, "house epidemics," may fairly be assumed to be from infection rather than from hereditary influence. Some able writers would discard heredity as one of the causes of tuberculous disease, but others, more conservative in their views, while believing that direct inheritance is rare, think that certain peculiarities of constitution, favoring susceptibility, are transmissible from parent to child.

RESUME.—1. Tuberculosis is an infectious disease.

2. The breath of the consumptive patient is not infectious.

3. The sputum is harmless as long as it remains moist.

4. Tuberculous infection is produced, in the great majority of cases, by the inhalation of dried and pulverized tuberculous sputum.

PREVENTION.

The restriction of infection.

It should be impressed upon consumptive patients and other persons living with them, that *the sputum (what they cough up) is dangerous and must be properly disposed of.*

The sputum should be received in a spit-cup or spittoon containing a little water or disinfecting fluid, and must never be spit upon floors, carpets, or received in handkerchiefs. If a disinfecting solution is used, corrosive sublimate is unsuitable, chloride of lime is efficient but irritates the air passages, carbolic acid (Solution E.) with 5 per cent. of tartaric acid or hydrochloric acid, will be the best disinfectant generally available.

If occasionally it is necessary to have handkerchiefs or cloths soiled with the sputum they should be boiled as soon as possible, and before drying.

The spittoon should be of such shape that the sputum may easily fall into the water without soiling the sides of the vessel. For patients not able to sit up, a small spit-cup with a handle should be used. When flies are present, it should be covered.

Spit-cups and spittoons should be emptied and cleansed often with boiling water and potash soap. When the house has a drainage system, the contents may be poured down the water-closet or slop-hopper; when it has not, they should be buried in ground which will not be turned up soon.

The sputum should not be thrown out upon the surface of the ground near inhabited places, nor on manure heaps, nor where animals may get it, nor where it may soil animal food.

Boxes filled with sand or sawdust should not be used. Cheap wooden and pasteboard spit-cups are now on the market, one of which may be burned daily or oftener with its contents as a convenient way of disposing of the sputa.

A pocket spit flask of small size has been devised, which may be used while away from home.

The floors, wood-work and furniture of rooms in which consumptive patients stay, should be wiped with a damp cloth, not dusted in the usual way.

The patient's clothing should be kept by itself and thoroughly boiled at the washing.

The patient should be made to understand that in neglecting these measures, he is imperiling his friends, and at the same time diminishing very much his own chances of recovery by re-infecting himself with the inhalation of his own dried and pulverized sputum.

After a death from this disease has occurred, the patient's room, clothing, and bed should be disinfected. For this purpose, boil all bed and personal clothing, or disinfect them when practicable in a

steam disinfector; wash furniture, wood-work, walls, and floors with carbolic acid solution (Solution E), and thoroughly expose the rooms to light and air.

If raw milk is used as food, especially if it is to be given to children, an assurance should be had that the cows which produce it are perfectly healthy and subjected to healthful treatment.

When there is any doubt as to the health of the cows which furnish the supply, the milk should be boiled before use.

Thorough cooking will remove all danger of tuberculosis through the medium of the meat supply.

Tuberculous mothers and those inclined to consumption should, under no conditions, nurse their babies.

To guard against contracting the disease.

By observing the rules which are expressed and suggested in the foregoing, the principal, if not all, danger of infection may be avoided.

Whatever has a tendency to undermine the general health increases the susceptibility to the infection and diminishes the power of recovery from incipient tuberculosis.

A fact abundantly shown in the dissecting room is, that many persons dying of other diseases, have had tuberculosis and have recovered in its early stages.

This tendency to recover is greatly strengthened by the habitual breathing of pure air. Means should be provided for the abundant ventilation of inhabited rooms, particularly of sleeping rooms, school-rooms, and churches.

The open air treatment of consumptives and those who are threatened with tuberculous disease, has given much better results than any other. Particularly in Germany, and to some extent in this country, such treatment has been systematized in "sanitaria" for consumptives. Here the patients have the advantage of a regular life, nutritious food and such exercise as they can bear without fatigue; but the chief curative agent is an abundance of fresh air. Even in the coldest of winter weather, patients, after a period of gradual habituation, and always guided by the judgment of the physician, pass the whole day walking in the open air, or sitting or lying on resting places wrapped comfortably in blankets. Usually no claim is made for advantages of climate. *An abundance of pure air is the all important thing.*

DISINFECTANTS.

For convenience of reference this list of disinfectants is re-printed in this connection.

SOLUTION A.—For excreta, privy vault, woodwork and other surfaces.

SOLUTION B.—For excreta, privy vaults.

SOLUTION C.—For clothing, the hands, excreta, vaults, furniture, and woodwork.

SOLUTION D.—For the person, the hands.

SOLUTION E.—For clothing, the hands, the person, excreta.

BOILING. — For clothing. — SULPHUR FUMIGATION.— For use only where liquid disinfectants cannot be used or to supplement other methods.

SOLUTION A.

Choloride of Lime,	6 ounces.
Water,	1 gallon.

Mix. Cost about three cents, or seventy-five cents a barrel. (Decolorizes and destroys fabrics.)

SOLUTION B. "*Purple Solution.*"

Corrosive Sublimate,	2 drachms.
Permanganate of Potash,	2 drachms.
Water,	1 gallon.

Mix and dissolve. Label, *Poison!* Cost, two or three cents a gallon, when the chemicals are bought by the pound. (Stains fabrics, etc.)

The permanganate of potassium in this solution is used to give it color as a precaution against mistakes. It also, in this quantity, increases the deodorizing qualities of the solution. This is approximately a 1 : 500 solution of the sublimate; therefore, mixed with an equal quantity of water or liquids to be disinfected, it gives us a 1 : 1000 mixture. One ounce of this solution contains very nearly one grain of the corrosive sublimate.

SOLUTION C. "*Blue Solution.*"

Corrosive Sublimate,	4 ounces.
Sulphate of Copper,	1 pound.
Water,	1 gallon.

Mix and dissolve. Label, *Poison!*

This is sixteen times stronger than Solution B, and is intended as a standard solution from which, by dilution with water, a solution of the proper strength for use may be made. To make from it a solution of the proportion of

1 : 500, add 8 ozs. to 1 gallon of water.
1 : 1000, add 4 ozs. to 1 gallon of water.
1 : 2000, add 2 ozs. to 1 gallon of water.

SOLUTION D.

Labarraque's Solution,	1 pint.
Water,	1 gallon.

Mix. Cost about twenty-five cents.

SOLUTION E.

Carbolic Acid (90 per cent)	7 ounces.
Water,	1 gallon.

Mix. This is approximately a five per cent solution, or in the proportion of 1 : 21.

Sulphur Fumigation. To use this effectively three pounds of sulphur should be burned in a room ten feet square. Every opening into the room, flues, doors, windows, cracks and crevices, must be closed, except the door by which the disinfector is to escape. The sulphur is to be burned in an iron kettle or other vessel set in a tub containing a little water to guard against fire. Ignite the sulphur with a few live coals or with a little alcohol or kerosene and a match. Leave the room quickly, for the fumes are highly poisonous when breathed, and close the door tightly. Let the room remain closed twenty-four hours or more. Then air thoroughly for several days.

Boiling for at least half an hour is a sure way to destroy infection. Immersion in Solution C, three or four ounces to one gallon of water, or in Solution E, one-half strength, will lessen the danger from infected clothing until it can be boiled.

WATER ANALYSIS.

During the year 1889, the work in the laboratory of water analysis was directed principally to meeting the demands of the people of the State for advice in regard to existing or proposed water supplies, public and private. The whole number of samples examined was 178, of which 104 were from wells, 41 from springs, 6 from public water supplies, 16 from sources of proposed public water supplies, 2 from cisterns, and 10 from miscellaneous sources. In this classification, one of the samples is placed in two classes.

Among the well waters, 30 could be pronounced good, 39 suspicious, and 35 bad. Of the spring waters, 28 were good, 7 suspicious, and 6 bad. It should be borne in mind, however, that the results of the examinations of private sources of water supply, as given in this and preceding reports are not to be taken as representative of

the general character of the well and spring water in the State. Most of the samples of water examined in the laboratory are sent because the owners of the wells and springs have already a suspicion that the water is not what it should be, or because typhoid fever or other disease has appeared under circumstances which render it probable that pollution of the water supply exists. It will be noticed, however, that 30 of the samples of well water, or nearly 29 per cent of them are designated as good, and an examination of the descriptions of the location and surroundings of the wells whence these good samples were derived, shows, in the great majority of instances, that the wells are favorably situated, or at least more favorably located than those from which the "bad" and "suspicious" samples came. We believe that some authorities are going much too far in making a sweeping condemnation of all wells as sources of drinking water supply. We, on the other side, as the work of examining samples of well and spring water in this State has gone on, have become more firmly convinced that wells and springs when favorably located, and in the case of wells, when properly constructed, are the very best of sources of water supply; but, at the same time, we are quite willing to concede that the great majority of wells are improperly constructed or badly located, and that therefore the water which they furnish is not of good quality. Almost everywhere in this State, the under-ground water where it issues from the earth in its normal condition, or where it is tapped by means of suitably constructed wells in suitable places, is almost invariably good and pure as a drinking water.

The truth of this is shown more clearly by the following information in regard to the spring waters examined in the laboratory. Of the 41 springs represented, 24 were shown to be favorably located, that is, far enough from houses, barn-yards, privies and the other usual sources of contamination, and of these every one was pronounced good. Among 13 samples from springs unfavorably located, one only supplied water chemically good, while 6 were pronounced suspicious, and 6 bad. Eight of the 13 unfavorably situated springs were in cities, and the other five in villages where they are exposed to drainage. Four springs are excluded from the classification because information is wanting as to their location; 3 of these were judged good and 1 suspicious.

The following is the tabulation of the results of the examinations of water made in 1889, analyses No. 292 to No. 469 inclusive.

MISCELLANEOUS ANALYSES—Expressed in Parts per 100,000.

Number of Analysis.	Origin of Sample.	Date of collection.		Total solids.	Loss on ignition.	Hardness.	Chlorine.	Free ammonia.	Organic ammonia.	Nitrites.	Nitrates.
292	Well, Chebeague	Jan.	25	16.2	4.8	3.25	6.2	.001	.005	None.	Slight trace.
293	Well, Portland	Feb.	13	3.6	1.4	1.27	.6	.006	.013	None.	Trace.
294	Grass brook, Fort Fairfield	"	13	2.4	2.8	11.80	.1	.000	.001	None.	Slight trace.
295	Aroostook River, Fort Fairfield	"	13	7.4	4.6	3.25	.0	.003	.028	None.	Trace.
296	Town pump, Fort Fairfield	"	13	24.2	8.0	21.19	.4	.001	.002	None	Heavy trace.
297	Spring, Rockland	"	18	2.8	1.2	1.27	.8	.000	.001	None.	Slight trace.
298	Silver lake, Dexter	Mar.	4	3.4	1.8	2.60	.2	.003	.014	None.	None.
299	Well, North Newburgh	"	4	41.2	20.8	21.19	6.4	.010	.004	Much.	Much.
300	Well, Springvale	"	6	36.0	22.0	13.31	7.2	.010	.015		
301	Spring, Fort Fairfield	"	5	15.0	5.6	14.06	.1	.001	.000	None	Trace.
302	Well, Fort Fairfield	"	5	36.4	17.2	22.02	3.8	.001	.001	None.	Much.
303	River, Machias	"	7	3.0	2.2	1.11	.5	.001	.008	None.	None.
304	Lake, East Machias	"	7	3.0	1.8	.79	.4	.000	.007	None.	None.
305	Well, Cornish	"	7	2.8	1.2	3.25	.2	.010	.013	None.	V'y sl. trace
306	Well, Cornish	"	7	3.8	1.8	2.60	.2	.008	.012	None.	Trace
307	Well, East Eddington	"	25	10.8	4.4	8.14	1.2	.000	.003	None.	Heavy trace.
308	Well, East Eddington	"	25	8.2	4.0	3.51	1.4	.000	.005	None.	Much.
309	Well, East Eddington	"	25	15.0	7.0	7.14	2.0	.003	.017	Slight trace.	Much.
310	Spring, Portland	"	27	2.2	1.0	1.69	.2	.000	.000	…………	Slight trace.
311	Public water supply, Seneca Falls, N. Y.	Apr.	3	20.8	6.0	13.31	3.6	.001	.014	None.	Trace.
312	Public water supply, Seneca Falls, N. Y.	"	3	20.4	5.8	13.76	3.6	.003	.014	None	Trace.
313	Well, Washburn	"	16	27.0	13.0	29.0	1.2	.001	.003	None.	Much.
314	Well, Augusta	"	20	20.0	6.0	10.30	2.2	.003	.008	None.	Heavy trace.
315	Grass Brook, Fort Fairfield	"	19	11.2	3.8	10.30	.2	.000	.002	None.	Heavy trace.

316	Spring, Augusta	"	23	11.0	5.8	7.86	.6	.000	.000	None.	Heavy trace.
317	Spring, Augusta	"	23	12.0	4.6	7.0	.6	.000	.001	None.	Much.
318	Spring, Augusta	"	23	20.0	4.6	7.71	.6	.000	.000	None.	Much.
319	Spring, Danforth	May	3	15.8	9.0	6.71	1.6	.000	.014	None.	Much.
320	Well, Waterville	"	13	9.8	2.2	6.71	2.0	.000	.002	None.	Heavy trace.
321	Public water supply, Waterville	"	13	3.0	1.8	1.95	.2	.001	.013	None.	V'y sl trace.
322	Well, Waterville	"	13	8.4	4.2	4.29	.6	.000	.002	None.	Much.
323	Kennebec River, Augusta	"	17	4.0	3.6	1.69	.1	.000	.015	None.	V'y sl. trace.
324	Kennebec River, Augusta	"	17	4.0	2.4	1.69	.1	.001	.013	None.	None.
325	Well, Newry Corner	"	16	39.2	10.4	8.14	5.8	.001	.061	None.	Much
326	Well, Augusta	"	18	47.0	25 0	16.11	3.2	.001	.008	Trace.	Very much.
327	Well, Limerick	"	17	35.6	7 0	15.32	4.4	.007	.006	Heavy trace.	Much.
328	Well, Kennebunk	"	20	26.6	13 0	5.29	5.2	.006	.008	Trace	V'y sl trace.
329	Spring, Kennebunk	"	20	5.8	2 4	1.95	1.8	.001	.002	None.	V'y sl trace.
330	Well, Milford	"	20	23.6	7 8	8.14	2.2	.091	.048	V'y sl. trace.	V'y sl. trace.
331	Well, Augusta	"	27	14.2	3 2	7.43	.9	.002	.000	None.	Slight trace.
332	Well, Sherman	"	27	25.8	8 4	8.14	2.8	.217	.166	Very much.	Much.
333	Well, Kennebunkport	"	28	14.6	4 4	8.14	1.4	.003	.007	None.	V'y sl. trace.
334	Well, Hampden	June	3	29.6	2	7.43	1.6	.001	.004	Slight trace.	Heavy trace.
335	Well, Wilton	"	10	46.6	29 8	14.37	4.0	.095	.008	Trace.	Very much
336	Well, Belfast	"	10	14.4	4 0	4.57	1.6	.000	.004	None.	Heavy trace.
337	Spring, Castine	"	12	3.4	0	1.69	.4	.001	.002	None.	V'y sl. trace.
338	Well, Eliot	"	14	6.6	8	2.60	.4	.001	.001	None.	Heavy trace.
339	Well, Eliot	"	14	25.4	5 6	6.71	3.4	.020	.049	Slight trace.	Heavy trace
340	Spring, West Baldwin	"	14	3.0	2 0	1.69	.1	.000	.002	None.	V'y sl. trace.
341	Public water supply, Bath	"	15	3.6	1.0	.95	.4	.000	.001	None.	Slight trace.
342	Well, Turner	"	14	6.4	2 0	2.60	.2	.003	.009	None.	Trace.
343	Spring, Old Town	"	18	20.2	6 4	11 05	1.8	.008	.015	Trace.	Slight trace.
344	Well, Portland	"	18	6.8	3 0	3.25	.8	.000	.030	None.	Heavy trace.
345	River, Bangor	"	20	4.2	2 8	1.95	.2	.000	.024	None.	Slight trace.
346	Well, Standish	"	20	6.6	3 0	1.95	1.0	.000	.032	None.	Heavy trace.
347	Spring, Livermore Falls	"	24	5.8	8	2.99	.0	.002	.004	....	V'y sl. trace.
348	Lake, Machias	"	26	6.4	4 2	.48	.6	.003	.049	None.	None
349	River, Machias	"	26	2.8	2 2	.48	.2	.000	.015	None.	V'y sl. trace.
350	Well, Eliot	July	1	5.8	2 2	.95	.4	.003	.004	None.	Trace.
351	Well, Eliot	"	1	13.8	2.6	4.57	.8	.000	.004	None.	Much.
352	Well, Wilton	"	3	32.6	8.6	8.14	3.2	.000	.004	None.	Much.
353	Well, Augusta	"	10	58.0	35.8	25.12	4.8	.000	.002	V'y sl. trace.	Very much
354	Spring, Kennebunk	"	10	7.6	2.6	3.25	1.4	.000	.000	None.	Slight trace.

MISCELLANEOUS ANALYSES—Expressed in Parts per 100,000—CONTINUED.

Number of Analysis.	Origin of Sample.	Date of collection.	Total solids.	Loss on ignition.	Hardness.	Chlorine.	Free ammonia.	Organic ammonia.	Nitrites.	Nitrates.
355	Well, South Livermore	July 11	7.2	3.0	3.61	.3	.000	.005	None.	Heavy trace.
356	Well, Kennebunkport	" 14	38.8	9.0	9.57	7.4	.001	.012	None	Trace.
357	Well, Sanford	" 17	6.2	.8	1.95	.5	.000	.000	None.	Heavy trace.
358	Well, Machias	" 14	58.0	.8	11.80	5.4	.149	.007	Very much.	Very much.
359	Well, Machias	" 14	18.6	.4	3.25	1.8	.004	.013	Trace.	Much.
360	Well, Machias	" 14	26.8	6.4	7.43	3.2	.000	.001	V'y sl. trace.	Much.
361	Well, Machias	" 14	28.2	10.4	5.00	4.0	.000	.006	Heavy trace.	Much
362	Well, Litchfield Corners	" 18	10.0	3.0	6.00	.4	.004	.006	None.	Slight trace.
363	Well, Litchfield Corners	" 18	43.0	14.0	16.43	5.7	.012	.008	Trace.	Heavy trace.
364	Spring, Temple	" 19	6.0	.4	2.60	.0	.000	.000	None.	V'y sl. trace.
365	Spring, Temple	" 19	4.0	.0	1.9[illegible]	.0	.000	.000	None.	V'y sl. trace.
366	Spring, Temple	" 19	3.2	.6	1.95	.0	.000	.001	None	V'y sl. trace.
367	Public water supply, Skowhegan	" 23	7.0	5.2	1.27	.2	.007	.026	None.	V'y sl. trace.
368	Well, Bowdoinham	" 27	90.0	30.8	19.60	29.8	.004	.023	None.	Much.
369	Well, Hanover	" 31	7.4	3.4	2.34	.4	.003	.004	None.	Heavy trace.
370	Well, Hanover	" 31	6.0	2.8	2.34	.2	.049	.016	None.	Trace.
371	Well, Plymouth	Aug. 4	17.0	5.2	9.57	1.6	.000	.005	None.	Much.
372	Well, Plymouth	" .4	15.6	8.4	5.71	1.6	.000	.005	None.	Heavy trace.
373	Well, Augusta	" 7	28.6	12.2	10.00	2.2	.004	.015	Much.	Much.
374	Well, Augusta	" 7	22.4	7.4	9.57	2.8	.002	.007	None.	Heavy trace.
375	Water supply, Presque Isle	" 7	18.4	4.6	14.84	.0	.002	.014	None.	Trace.
376	Well, Winslow	" 8	30.6	12.4	14.52	2.8	.000	.000	None.	Heavy trace.
377	Well, Springvale	" 9	14.0	7.0	3.25	1.4	.001	.002	None.	Very much.
378	Well, Springvale	" 9	6.6	8.4	2.84	.4	.003	.002	Trace.	Heavy trace.

379	Long Creek, Cape Elizabeth	"	9	9.8	8.8	3.90	.8	.006	.043	V'y sl. trace.	V'y sl trace.
380	Mitchell brook, Portland	"	9	8.0	6.4	1.27	.7	.009	.031	Slight trace.	None.
381	Well, Greenville	"	12	4.0	2.4	2.60	.2	.001	.002	None.	Slight trace.
382	Spring, Bangor	"	12	14.4	6.2	7.43	1.5	.000	.003	None.	V'y sl. trace.
383	Spring, Augusta	"	15	42.0	14.8	18.81	4.0	.000	.005	None.	Very much.
384	Well, Springvale	"	20	10.8	5.6	4.57	1.0	.005	.001	None.	Much
385	Well, Crystal	"	19	93.2	21.8	45.72	4.8	.025	.030	Heavy trace.	Very much.
386	Spring, Augusta	"	26	14.2	4.6	9.57	.8	.001	.001	Trace.	Trace.
387	Well, Green's Landing	"	27	18.4	10.2	3.25	3.8	.000	.004	Heavy trace	Trace
388	Well, Green's Landing	"	27	27.8	12.6	5.29	6.4	.005	.00[illegible]	Heavy trace	Heavy trace.
389	Well, Waldoboro'	"	27	11.4	5.0	6.0	.4	.000	.001	Trace.	Slight trace.
390	Well, North Newburgh	"	27	13.6	4.4	5.71	.8	.000	.00[illegible]	V'y sl. trace.	Slight trace.
391	Well, North Newburgh	"	28	56.0	20.6	32.22	4.4	.000	.00[illegible]	Much.	Heavy trace.
392	Spring, Calais	"	28	6.6	4.8	1.95	.4	.000	.00[illegible]	None.	Trace
393	Well, Brooks	"	29	6.0	2.8	4.57	.5	.000	.000	Slight trace.	Slight trace
394	Well, Winthrop	"	30	12.0	3.4	1.95	.4	.001	.002	None.	Heavy trace.
395	Well, Parsonsfield	Sept.	3	22.0	4.8	4.57	3.0	.000	.011	None	Slight trace.
396	Spring, Springvale	"	3	14.2	7.6	3.25	1.2	.000	.002	Slight trace.	Heavy trace.
397	Well, Richmond	"	9	17.8	2.8	7.43	1.6	.003	.003	V'y sl. trace.	Trace.
398	Water supply, Richmond	"	9	7.2	4.0	1.95	1.2	.000	.013	None.	Slight trace.
399	Well, Machias	"	7	9.6	5.6	2.60	1.0	.003	.002	V'y sl. trace	Trace.
400	Well, Machias	"	7	11.0	5.0	3.90	1.2	.000	.002	None.	Heavy trace.
401	Spring, Lewiston	"	9	3.8	3.6	1.95	.2	.000	.001	None.	Slight trace.
402	Well, Popham Beach	Aug.	28	10.2	4.4	4.57	1.6	.000	.000	Trace.	Trace.
403	Spring, Andover	Sept.	11	7.0	3.2	2.60	.0	.000	.002	None.	Trace.
404	Well, Kineo	"	16	9.0	3.0	3.90	.8	.001	.003	Trace.	Heavy trace.
405	Well, Eliot	"	16	10.8	5.6	3.90	1.0	.000	.002	None.	Heavy trace.
406	Well, Eliot	"	16	31.6	7.2	6.0	5.4	.007	.037	None.	Much.
407	Spring, Yarmouthville	"	21	6.8	1.4	2.60	.6	.003	.009	Trace.	Heavy trace.
408	Well, St Albans	"	20	204.8	63.2	81.60	38.4	.043	.010	Much.	Slight trace.
409	Well, Livermore Falls	"	20	45.4	9.2	11.80	12.2	.012	.013	Much.	Slight trace
410	Well, Augusta	"	24	15.6	4.0	9.57	.8	.004	.007	None.	Trace.
411	Well, Randolph	"	24	10.6	5.0	5.29	.4	.029	.005	Trace.	V'y sl trace.
412	Well, Augusta	"	25	21.0	9.4	26.62	4.4	.268	.014	Much.	Very much.
413	Well, Curtis Corner	"	25	4.8	1.6	2.60	.2	.001	.003	None.	Trace.
414	Spring, Curtis Corner	"	25	4.6	2.0	3.25	.2	.000	.001	None.	Trace.
415	Spring, Portland	"	27	7.8	3.2	2.60	.7	.055	.008	Much.	Heavy trace
416	Spring, Portland	"	27	28.2	12.8	11.05	4.8	.000	.006	None.	Heavy trace.
417	Well, Gorham	"	29	11.6	2.4	4.57	1.4	.010	.008	Heavy trace.	Trace.

MISCELLANEOUS ANALYSES—Expressed in Parts per 100,000—CONCLUDED.

Number of Analysis.	Origin of Sample.	Date of collection.	Total solids.	Loss on ignition.	Hardness.	Chlorine.	Free ammonia.	Organic ammonia	Nitrites.	Nitrates.
418	Spring, Cornish	Sept. 26	5.6	1.8	3.90	.1	.000	.002	Slight trace.	V'y sl trace.
419	Well, Sebago	" 29	2.6	2.2	3.90	.2	.000	.002	None.	V'y sl. trace.
420	Well, Gorham	Oct. 4	11.8	3.4	8.86	.4	.001	.000	None.	Slight trace.
421	Well, Gorham	" 4	9.6	3.4	5.00	1.5	.003	.004	None.	Heavy trace.
422	Well, Presque Isle	" 1	25.6	6.0	22.10	1.0	.000	.002	None	Heavy trace.
423	Spring, Guilford	" 4	14.2	4.8	15.32	.0	.000	.000	Trace	Heavy trace.
424	Well, Machias	" 2	26.8	13.2	8.14	3.8	.173	.010	Very much.	Much.
425	Cistern, Skowhegan	" 12	3.0	2.2	2.60	.1	.015	.009	None	Trace.
426	Well, Farmington	" 12	38.2	18.6	14.52	6.2	.000	.003	None.	Very much.
427	Spring, Portland	" 14	41.2	12.6	14 84	3.0	.042	.024	Much.	Heavy trace.
428	Spring, Portland	" 14	78.4	25.2†	22.86	9.4	.001	.012	None.	Very much.
429	Spring, Portland	" 14	34.2	20.2	14.84	4.8	.000	.005	Heavy trace.	Very much.
430	Spring, Portland	" 14	4.2	1.6	1.95	.8	.003	.006	None.	V'y sl trace.
431	Spring, Cape Elizabeth	" 15	8.4	4.0	5.29	1.1	.003	.007	None.	V'y sl trace.
432	Spring, Green's Landing	" 13	6.0	1.8	1.56	1.2	.002	.004	None.	V'y sl. trace.
433	Pond, Green's Landing	" 13	4.4	3.8	.48	1.2	.002	.024	None.	V'y sl. trace.
434	Well, Bethel	" 15	13.6	7.0	8.90	1.9	.000	.012	None.	Much.
435	Well, Bethel	" 15	7.2	2.6	3.25	.6	.000	.004	V'y sl. trace.	Trace
436	Well, Sedgwick	" 17	9.6	3.6	5.71	1.0	.020	.007	Trace.	Trace.
437	Well, Machias	" 16	9.0	3.4	4.29	1.6	.000	.001	None.	Heavy trace.
438	Well, Jay	" 20	3.6	1.2	1.95	.2	.000	.003	V'y sl. trace	Trace.
439	Spring, Jay	" 20	2.8	2.2	.95	.2	.000	.001	None.	Slight trace.
440	Brook, Portland	" 28	10.4	7.0	5.71	1.2	.000	.050	None.	Slight trace.
441	Brook, Cape Elizabeth	" 26	10.0	8.6	4.29	.9	.017	.039	None.	V'y sl. trace.

442	Brook, Cape Elizabeth	"	26	10.2	3.0	4.57	.9	.020	.033	None.	Slight trace.
443	Spring, Waldoboro'	"	28	6.4	1.8	3.25	.6	.006	.002	None.	Slight trace.
444	Well, Lisbon Falls	"	27	29.6	16.0	11.05	3.6	.005	.016	None.	Heavy trace.
445	Cistern, Augusta	"	31	367.36	18.30	88.40	2570.0	.010	.106	None.	V'y sl. trace.
446	Distilled water, Augusta	"	31	1.4	1.2	.00	.0	.003	.003	None.	None.
447	Well, Mercer	"	28	3.2	1.6	1.95	.3	.001	.002	None.	Trace.
448	Cistern, Cape Elizabeth	"	30	5.8	3.4	3.90	.2	.002	.007	None.	Slight trace.
449	Well, Gorham	Nov.	2	10.8	3.0	4.57	1.4	.000	.004	None.	Heavy trace.
450	Spring, Yarmouthville	"	8	17.6	8.4	7.43	2.4	.001	.006	None.	Heavy trace.
451	Spring, Yarmouthville	"	7	10.8	4.2	4.29	1.6	.001	.006	None.	Heavy trace.
452	Well, Clinton	"	11	18.0	9.4	10.0	1.0	.002	.002	None.	Very much.
453	Well, South Portland	"	12	6.0	2.2	3.25	.8	.000	.003	None.	V'y sl. trace.
454	Well, Eliot	"	14	40.0	15.2	16.90	3.0	.003	.003	None.	Heavy trace.
455	Well, Eliot	"	16	21.6	9.0	9.57	3.6	.000	.009	None.	Very much.
456	Well, South Portland	"	15	16.6	10.0	6.0	2.8	.014	.005	Slight trace.	Much.
457	Spring, South Portland	"	18	6.4	3.2	4.57	1.0	.001	.009	None.	V'y sl. trace.
458	Well, Clifton	"	21	23.6	6.8	6.29	4.2	.040	.011	Much.	Heavy trace.
459	Spring, Eliot	"	23	10.0	4.4	7.43	.6	.000	.001	None.	V'y sl. trace.
460	Well, Eliot	"	23	23.6	5.8	6.00	3.6	.000	.003	None.	Heavy trace.
461	Well, Hartland	Dec.	3	16.4	6.0	6.00	1.6	.001	.006	None.	Heavy trace.
462	Spring, Bethel	"	3	2.0	.4	.48	.2	.000	.003	None.	V'y sl. trace.
463	Well, North Vassalboro'	"	6	345.0	52.4	82.15	174.4	.030	.018	None.	Much.
464	Well, North Vassalboro'	"	6	39.2	16.2	22.86	3.4	.000	.010	None.	Heavy trace.
465	Well, North Vassalboro'	"	5	21.4	6.8	12.26	1.6	.000	.003	None.	Heavy trace.
466	Spring, Westbrook	"	5	3.2	2.0	1.95	.4	.000	.000	None.	V'y sl. trace.
467	Well, Deering	"	5	8.8	3.8	5.29	.8	.001	.014	None.	Trace.
468	Well, Verona	"	10	37.4	18.6	11.60	4.6	.015	.018	None.	Much.
469	Well, Clinton	"	21	26.6	11.0	14.06	1.6	.003	.035	None.	Much

NOTES ON SOME OF THE SAMPLES OF WATER EXAMINED IN THE LABORATORY.

No. 293. This sample was taken from a well around which various sources of pollution were grouped too near—the sink drain was at a distance of sixty feet, the privy thirty-five feet, and the stable, barn-yard and pig-pen from twenty-five to thirty feet. The analysis gives evidence of pollution with organic matter.

Nos. 294 and 315. Grass Brook, Fort Fairfield. The analyses were made to determine the suitability of the water as a village supply. Both analyses show that the water is organically very pure. The brook arises from springs. The degree of hardness of the water is much below that which is obtained from wells in all that region.

No. 295. This sample was taken from the Aroostook river about midway between the two shores at Fort Fairfield for the purpose of comparing the results of its examination with that of No. 294.

No. 297. From the report to the sender: "You will notice that the total solids is very low in quantity, that it is a very soft water, and that the indications of organic matter as represented by the amount of chlorine, and free and organic ammonia are very slight indeed. It is apparently a very good spring water for drinking purposes."

No. 298. Silver lake, Dexter. The following report was made: "I enclose the results of the analysis of the sample of water from Silver lake. In these results there is nothing which would justify me in pronouncing the water unsuitable for the purposes of a public water supply. There is, however, rather a larger quantity of free ammonia and also of organic ammonia than is found in the best of lake waters in the State. The average free ammonia in twenty-nine analyses of public water supplies, taken from lakes and ponds in this State, is only .001, and the average free ammonia in the supplies taken from rivers is only slightly greater. The organic ammonia in the lake supplies is .010. I should like further information in regard to your method of taking the sample,—that is, the distance from the shore, etc. What is the nature of the growth around the lake?"

Nos. 299 and 391. These two samples were taken from a deep well drilled through ledge and the results are not so favorable as

would generally be expected, but are quite like what we have somewhat frequently found in deep wells drilled through rock. Pending further examinations of samples from this well, a positive opinion was not given as to the quality of the water. It will be noticed that the results obtained from the two samples are quite different, and the difference may have been due in part to the fact that the bottle in which No. 299 came was not free from suspicion. We may add that sources of pollution were within fifty feet of the well,—the privy, stable, barn-yard, and pig-pen.

No. 300. From a well situated fifty feet from sink drain and privy. There was a suspicion that the bottle in which the sample was sent had not been made chemically clean. Another sample received later in the season in a bottle sent from this office yielded different results, as will be seen in the tabulation. (See No. 384.)

No. 301. A spring water of good quality for drinking purposes.

No. 302. A well situated in gravelly soil, about thirty feet from a privy and forty feet from a barn-yard. The chemical results make it apparent that the organic matter is quite thoroughly oxidized in passing through the soil, but the chlorine and nitrate results show that the water is to be regarded with suspicion, notwithstanding the small amount of organic matter present.

Nos. 303 and 304. "I enclose the results of the analyses of the last two samples of water which you sent, Nos. 303 and 304, and also a blank showing the results of the examination of No. 217 which you sent last fall, report of which has already been made. As I telegraphed to you, the differences which are found in the character of the water by means of the chemical processes are so small, that the chemical examinations will not help you much in making a decision as to which source would furnish the more suitable supply. It is never well to base a decision upon a single chemical analysis, for the reason that the character of certain sources of supply varies very much at different times, but, as far as can be judged from the examinations which I have made, any of the three sources of which you have submitted samples to me would furnish a good water, judging, of course, from the chemical point of view alone. You should make a careful examination of all the surroundings of the proposed sources of supply and take into account all present and prospective possibilities of pollution and choose accordingly. It is noteworthy that all of the samples are very soft waters, especially the sample which you sent last fall, and No. 304, or the

one from Lily lake, which are just alike as regards their degree of hardness. As regards the organic ammonia figures, it will perhaps interest you to know that the average for the samples (twenty-nine) from the public water supplies which are taken from lakes and ponds is .010, and of the samples from the supplies taken from rivers is .016. No. 304, from the chemical point of view alone, is slightly the best of the three, but the advantage from this point of view might be outweighed by other considerations.

Nos. 305 and 306. We copy a part of the report on the samples as a repetition of the caution which has repeatedly been given to notify the secretary, when a slight delay is not objectionable, and to await the receipt of a bottle from this office, which we know has been made chemically clean.

"I have repeatedly cautioned in the *Sanitary Inspector* against sending samples before notifying this office and waiting for instructions. I have done this for the reason that most of the samples which are taken without instructions in regard to collecting are worthless. It was evident that the samples in the three jugs which you sent were not collected with sufficient care, or at least that sufficient care was not taken to have the vessels which contained them chemically clean. One of the jugs contained several fragments of straw of considerable length, apparently some of the packing in which they were originally shipped by the manufacturer. This seemed to me to indicate that the jugs had not been rinsed out so thoroughly as is enjoined in the little circular which I enclose. Another one of the jugs, apparently one which had seen previous use, contained an old corn-cob stopper two inches and a half long. This last sample I threw away for the reason that it was useless to waste half a day in analyzing it. I enclose blanks which give the results of Nos. 1 and 2. From the want of assurance that the jugs were clean I cannot pronounce upon the character of the waters. I would, however, venture the opinion that they are taken from ground which naturally supplies a good water."

No. 307. This sample of water is chemically good, though the well is badly located, namely, in the cellar beneath the house.

Nos. 308 and 309. "No. 308, from a well twenty-two feet deep through dark gravelly soil, and gravelly sub-soil intermingled with clay, close to the only door of a house where the people throw a large amount of slops. In spite of the very unfavorable location of

this well I find that the water is chemically much better than I should have expected; in fact, there is nothing against the water excepting a large quantity of nitrates, the result undoubtedly of a pretty thorough oxidation and nitrification of the organic matter before it reaches the water bearing stratum. But no matter what results this analysis shows, the well must be regarded as a very unsafe one to use for a drinking supply, for, though the polluting matter appears to be pretty thoroughly filtered out by the soil now, it may not be at all times." No. 309. From a well eleven feet deep, soil, a dark, swampy, gravelly loam; subsoil, compact gravel, resting on a clay slate ledge, located very near the house and close to the back door. "The chemical results with this sample, show it to be badly polluted with two or three times as much free ammonia as there ought to be in well water, and five or six times as much organic ammonia as there should be, together with an excess of chlorine and nitrates.

The difference in the character of the two waters from a chemical point of view is due largely undoubtedly to the difference in the depth of the well, and the difference in the character of soils through which the polluting matter has to pass before reaching the well."

No. 310. From Wescustogo spring, North Yarmouth. "The analysis shows the water to be of very superior quality for drinking purposes. The total solids is very small in quantity, it is a very soft water, and there is an entire absence of both free and organic ammonia quite remarkable, even among the purest of spring waters."

Nos. 311 and 312. These two samples are from the water supply of Seneca Falls, N. Y., filtered and unfiltered, and the examinations were made for the purpose of determining the chemical changes effected by the system of filtration which is there employed, that of the Hegeman Oliphant Company. No. 311 is the filtered water, No. 312 the unfiltered. Both samples showed some turbidity and the degree of it hardly differed in the two. There was a slight amount of sediment in each, and a second determination of the total solids was made for each sample after shaking it up, resulting in filtered, 21.2; unfiltered, 22.4.

No. 313. From a drilled well, sixty-two feet in depth, the lower two-thirds being through rock.

Nos. 316, 317 and 318. These samples were taken from three of the so-called Diamond Springs in Augusta.

No. 319. From a spring situated at the foot of a hill, with a hotel and its back buildings on the top of the hill from forty to fifty feet distant. The results of the analysis are not favorable, and the relative location of the spring and buildings is still more unfavorable.

No. 321. From the city water supply, Messalonskee stream, Waterville.

Nos. 323 and 324, were taken from the Kennebec river. No. 323 from the canal whence the city supply is taken, and No. 324 from the river channel above the dam.

No. 325. From a well twenty-two feet deep, from fifty to sixty feet from sink drainage, privy, stable, barn-yard, etc., and 100 feet from a small pond filled with sawdust. Ten feet from the surface there is a hard-pan described as "pin gravel hard as iron," and 12 feet farther through this formation, we come to a white sand in which the water is found. The results of the analysis of this sample of water illustrates the fact which comes to light quite frequently in the work of the laboratory, that an impermeable stratum through which wells pass a little distance below the surface is very likely to collect polluted soakage, if any exists in the neighborhood, and run it into the well. Such wells are much more likely to become polluted than those which pass all their depth through ordinary soil.

No. 326. A good example of a city well with sources of pollution too near, and chlorine quantity greater than is normal for the unpolluted soil in the locality, and excess of nitrates and a slight excess of organic ammonia. "A moderate amount of pollution is indicated, and while it is so moderate in quantity that I should not feel justified in condemning the water as absolutely dangerous, on the other hand I could not give an assurance that the water will remain at all times absolutely free from danger. This is not very definite, but from the nature of the case it is impossible to be more positive."

No. 327. This sample is from a well drilled its whole depth, fifty-nine feet. From the description given, the location of the well appears to be favorable. The results are interesting and we hope in the near future to give the wells of this particular kind in the State a fuller study.

Nos. 328 and 329. Were sent for the purpose of determining which of the two is the better for a private water supply. A comparative glance at the results suffices to answer.

No. 330. "This water is wholly unfit to use for drinking purposes." The sink drainage, privy, stable, barn-yard and pig-pen were all at distances ranging from ten to twenty-two feet from the well.

No. 332. From a well thirty feet deep dug through sandy soil and gravelly subsoil, with three feet of red ledge, twelve feet from the surface. The sink drainage, privy, stable and barn-yard are at distances of from ninety to one hundred and thirty feet from the well. Dr. Owen who forwarded the sample, reported the general health of the users of the water good, but that strangers never try it a second time. The following is the report on the sample:

"The sample of water which you send is a curiosity. As you will see by the enclosed blank, giving the results of the analysis, it is a very bad water, in fact, it is one of the worse which has been received in this office. It is also about as bad microscopically as it is chemically. It contained a large quantity of sediment, which, upon examination, was found to be the micelium of one of the fungi. Infusoria were very abundant, especially rotifers and vorticellæ. Putrefaction bacteria were also plentiful. It seems to me that it must be a curious sort of people who will drink such water. A dirty German doctor drank sewage for some time as a matter of experiment, and did not think his health was injured by so doing. The persons who use water from this well may possibly do so with impunity. Some samples of humanity are tough. There is always danger, however, that disease germs may find access to such polluted wells, with the other filth, and then the immunity from harm might end suddenly. Some people, however, are so fastidious that they do not like to drink the soakage from barn-yards or other polluted water, even if the probabilities were that in so doing they would not receive physical harm.

"The question is, how does the polluting matter reach the well and from what source? From the history which you give I cannot answer, and it is a mystery to me. I am inclined to think, though, that that red ledge has something to do with it; that the ledge is inclined in such a direction that it catches the soakage from some of the sources of pollution and runs it directly into the well. I know of one other well in Aroostook, near Presque Isle, in which the barn-yard is situated about ninety feet from the well and cannot send its surface drainage into the well, but yet the well is badly polluted and there have been two outbreaks of typhoid fever in the houses using

the water from that well within a few years. In that case there was a ledge a few feet below the surface, and the soakage from the barn-yard sinking down through the soil until it reaches it undoubtedly runs along its surface directly into the well. I am very much interested in the well from which this sample is taken and I should be very glad if you could learn anything about the probabilities of how it is polluted."

No. 333. "An examination of the description of the surroundings of the well as given in the blank which you filled, shows that, especially for a sandy soil, the distance of the sink-drain and privy (35 to 40 feet) is not so great as it should be; that is, not far enough to avoid all possibilities of the soakage of pollution into the well. The chemical examination, however, does not give results which would condemn the water, but they show that there is a slight pollution from some source. The free ammonia should not be represented by a larger figure than .001 or .002, but, as you will see by referring to the accompanying blank, it is .005. The organic ammonia is represented by a figure which is about as large as is permissible in a well water which we would call good.

If you should happen to have cases of typhoid fever in your house, the intervening thickness of soil between the sink-drain and privy would not be sufficient to protect the well from infection. I would therefore recommend either the removal of the vault to a greater distance, or the use of some form of conservancy which will not permit of soakage into the soil, and would also recommend the carrying of the sink drainage farther from the well through a tight pipe drain if necessary. If the rock cesspool is within thirty-five or forty feet of the well it is much too near."

No. 335. A well sixteen feet deep through a clayey loam and subsoil of hard gravel. Its distance from the usual sources of pollution is from thirty-five to fifty feet. "The water is very bad, and the analysis would indicate pollution with a large quantity of organic matter, probably derived by soakage from neighboring privies and sink drainage. To help you to judge how badly the water is polluted, I would say that good well water does not contain more than .001 or .002 of free ammonia, while this has .095. This water should not be used at all."

No. 337. A good example of spring water, desirable for drinking purposes. The spring is on a side hill 1,000 feet from any source of pollution.

No. 338. From a well sixteen feet deep; soil, gravel; subsoil, hard clay; sink drainage and privy about thirty feet distant. "Chemically there is nothing against the water, excepting the very slight suspicion which the heavy trace of nitric acid might give. The results are much better than I should anticipate with the sink-drain and privy so near, and is probably due, in part at least, to the care which you took in constructing the sink-drain. I notice for the first time while making this report, that there is a case of typhoid fever in the house. Under those circumstances, I would not trust myself for a moment, to use the water from that well, no matter how good the chemical results may be. The infection of typhoid fever is a living germ, which is supposed to be capable of development outside of the human body. A mere trace of this infection finding its way into the well, might multiply sufficiently to make the water dangerous to the users of it, and the way for the transportation of the infection is not as difficult through a gravelly soil as through ordinary loam. I should therefore advise not using the water from this well for a long time unless it has been boiled previously. If the cesspool is only two rods from the well it is dangerously near."

No. 344. This sample was taken from a well dug some twelve feet through gravel and then drilled six feet through rock. There are no sources of pollution near it, excepting a cesspool recently established. "The chemical results show the water to be very good for drinking purposes; indeed it could hardly be better."

No. 345. The sample was taken from the Penobscot river above the dam at Bangor.

No. 346. A well sixteen feet deep through a light, sandy soil and subsoil. The sink drainage, privy, and stable are within from thirty to fifty feet. "Chemically, there is nothing whatever against the water, but as regards the location of the well, I should say that there is much against it, the sources of contamination are all so near, and I should feel afraid that at times pollution would reach the well. That would be favored by the sandy soil. I should advise, keeping the sink drainage at a good distance from the well, carrying it in a tight iron pipe if necessary, and either removing the privy to a greater distance if possible, or using a perfectly tight superficial vault, the use of the earth closet, or Prof. Angell's sanitary closet. The accompanying circulars may be of interest to you."

No. 347. A spring water, containing slightly more organic matter than is found in the very best of spring waters, and due, undoubtedly, to the somewhat mucky soil whence it issues, and to some microscopic fresh water algæ which it contains.

No. 348. Contains much too large a quantity of organic matter for a public water supply, if we are to judge from this single analysis.

No. 352. From a well seventeen feet deep through gravelly loam and hard gravel subsoil. The sink drainage is twenty-seven feet distant and the privy and stable forty feet away. The water is not so bad as could be expected, but the excess of chlorine and nitrates show that the well feels the influence of the neighboring sources of pollution.

No. 355. From a well eighteen feet deep; soil, gravelly loam; subsoil, "pin gravel;" sink drainage, privy and stable from thirty to sixty-five feet distant; dry earth is used in the box vault.

No. 357. From a driven well, twenty feet deep, located in a cellar.

Nos. 358, 359, 360 and 361. From Machias—No. 358, ten feet deep, located in a cellar; sink-drain, fifty feet, and privy, stable, barn-yard and pig-pen from 100 to 135 feet distant; soil, clay and loam. "This well is represented by all the figures on the enclosed blank as, chemically, a very bad water. It should not be used for drinking purposes." No. 359. From a well thirteen feet deep in level ground; soil, clay and loam; sink-drain, 216, privy, 110, stable, barn-yard and pig-pen from sixty to seventy feet distant. "This water is not so bad chemically as No. 358, but it is not good drinking water." No. 360. Well twelve feet deep in cellar; soil, clay and loam; sink-drain and privy seventy-five feet, and stable, barn-yard, and pig-pen from 100 to 125 feet distant. This water is much better than either of the preceding, and is chemically good. "This well has much less organic matter in it than either of the preceding, and from a chemical point of view might be considered free from suspicion if it were not for an excess of chlorine and of nitric acid, indicating apparently a slight pollution which has probably come a considerable distance through the soil." No. 361. Well twelve feet deep, water coming in from the top of a ledge; soil, same as in the preceding: 150 feet above level of the river, and four miles from the sea shore; sink-drain, 105, and privy 120 feet distant. This cannot be pronounced a bad water, but at the same time the excess of chlorine and the nitrates render it slightly suspicious.

Nos. 362 and 363. No. 362. Well about sixteen feet deep, entering ledge two or three feet below the surface; sink-drain, fifty, privy and stable seventy-five, and barn-yard twenty feet distant. "This is by far the better sample of the two, judging by the chemical results, though the excess of free ammonia would make the water somewhat supicious even if the well were not so near the barn-yard." No. 363. From a well, depth not known; sink-drain fifty and privy thirty-five feet away. "The general results of the analysis indicate that the water of this well is quite badly polluted."

Nos. 364, 365, and 366. Samples from three different springs in Temple; all are remote from polluting influences and all are remarkable for their great organic purity, and especially for the complete absence of chlorine in any of them.

No. 368. Well thirty feet in a clayey soil; sink-drain twenty-five, privy twenty-six, stable only four feet distant, and chemical results accordingly. "The total solids alone would condemn the water the amount is so excessive. It is also a very hard water, the chlorine is exceedingly high, and both the free and organic ammonia are in great excess. The water is wholly unfit for use for drinking purposes."

No. 373. A city well.

No. 374. Another city well; chemically, not absolutely bad, but deserving suspicion.

No. 376. Well ten feet deep and water taken from gravel on top of ledge; nearest source of pollution, sink-drain sixty-six, and privy ninety feet distant. A tolerably good drinking water.

No. 377. From a well dug sixteen feet, then a pipe driven four feet; soil, sandy and rocky; sink-drain thirty-five feet; privy and stable forty feet distant.

No. 378. A driven well twenty feet deep; ground sandy, sink-drain, a wooden pipe, passes within two feet, and privy twenty feet distant.

No. 381. From a well situated on a hillside above the buildings, ninety feet distant from the sink-drain, and forty to sixty-five feet from the privy, stable and pig-pen. A very good well water.

No. 383. From a spring in the cellar of a business block on Water street. An excess of chlorine and nitrates. It is supposed the water comes from beneath the clay underlying the city.

No. 385. From a drilled well thirty feet deep, twenty-eight feet of which is through ledge supposed to be solid; sink-drain seventy, and pig-pen and privy forty-eight, barn-yard fourteen feet distant.

"I enclose a blank which will give you the results of the chemical examination of the sample of water which you sent. The water is badly polluted and bad in every way. This is also an extremely hard water. The Aroostook waters generally ranging from twenty to twenty-five degrees of hardness, while this as you will notice is over forty-five. This extreme hardness, taken with the great excess of total solids, would condemn the water without the evidence of pollution which we get in the figures representing the chlorine, free and organic ammonia, nitrites and nitrates."

No. 387. A well seven one-half feet deep with only six inches of water, situated lower than the street and the nearest house; thin soil underlain with granite; forty feet distant from one sink-drain, and sixty feet from another; privy ninety feet distant. Cases of typhoid fever may have originated from the well.

No. 388. From a well eighteen feet deep, in gravelly soil; and much lower than the house; all waste matter and refuse are dumped within twenty-five feet. Cases of typhoid fever in the nearest house.

No. 389. From a "test-well" dug one-third of a mile east of the village on a hill at least fifty feet above it, and 2,000 feet distant from the nearest building. The well was dug for the purpose of finding a suitable supply for the village. "The figures indicating chlorine, free ammonia, organic ammonia and nitrites and nitrates are all very low and as we base our conclusions mostly upon these results there could be no question as regards the chemical purity of this water. The water from this well is of medium hardness, or perhaps it would be better if I say as regards the hardness that for drinking purposes it would be entirely unexceptionable, but that for washing purposes there would probably be some complaint of its hardness."

No. 390. From a drilled well forty feet deep and cemented down to the ledge; sink-drain fifty, barn-yard twenty-five, and privy, stable, and pig-pen fifteen feet distant. The water from the well is said to have an unpleasant taste and reddish appearance sometimes after rains. This well is situated very close to that from which samples No. 299 and 391 were taken. At the time this sample was taken the well was evidently supplying good water, but the history of the well makes it quite certain that sometimes during rainy weather polluting matter gains access to it, notwithstanding the fact that it is a drilled well.

No. 393. A drilled well, thirty-seven feet deep, the ledge coming to within seven feet of the surface. The well is cemented from the

top of the ledge to the surface of the ground. This is organically a good and pure drinking water. It is drawn through 125 feet of lead pipe. "No lead was found upon testing, nevertheless I should advise pumping out one pailful each time before taking any for drinking or cooking purposes. A sample taken in the morning before the pipe is pumped out might contain lead."

No. 395. From a well sixteen feet deep; distance of sink-drain, privy and stable, forty, fifty and seventy-five feet respectively.

No. 396. Taken from a tap of the Butler Spring water supply, Springvale.

No. 397. From a well in a yard between two houses, eight or ten feet from a cemented sink-drain, fifty and sixty feet from two privies, and twenty-five feet from a barn. The well passes through blue clay and finds water in a quicksand. The slope of the land is favorable as regards the surface drainage.

No. 403. From a spring in a cellar; sink-drain forty feet, and privy 100 feet distant. The surroundings are kept in good condition. The water is of excellent quality.

No. 404. From a well at Kineo, twenty-three feet deep, and twenty feet above the lake, water coming through gravel. No sources of pollution within 150 or 200 feet. "The water is of good quality for drinking purposes."

No. 405. From a well twenty feet deep, sink-drain twelve and privy twenty-five feet distant; soil "sandy with clay mixed with quicksand." "The chemical results from the sample are better than are usually obtained with sources of pollution so near, indeed, from the chemical results alone we should have to call the water quite pure, but the proximity of the privy and sink-drain would always make the water highly suspicious. I should advise great care in disposing of the sink drainage, and in managing the privy. The water, though now found to be pure, is liable at any time with the present arrangements to become infected so as to give rise to typhoid fever or other disease."

No. 406. From a well in the corner of a barn-yard, and three and one-half rods from sink-drain and privy. The soil is hard gravel. "The results show that the water is badly polluted and it is totally unfit to use as a drinking water supply."

No. 407. From a spring ten feet from a hen-pen, and eighty-five and 110 feet respectively from privy and sink-drain. "This water though comparing unfavorably with the best of spring waters in point of purity is not polluted enough to be called absolutely bad.

I send you a copy of the Fourth Annual Report, and the paragraphs "free ammonia" and "organic ammonia" on pages thirty-five and thirty-six will help you to judge of the standing of the sample of water which is now in question."

No. 408. From a well eighteen feet deep; sink-drain ten, privy forty-five, and stable fifty feet distant; soil gravelly The odor and taste of the water is sometimes unpleasant. "The sample of water which you sent for analysis is entirely unfit to be used as a drinking water, as the figures on the enclosed blank will show you. The water contains a higher total solids, and I believe a larger quantity of chlorine, than we have found in any sample before. The organic ammonia is in excess, and the free ammonia and nitrites, indicating a large quantity of putrefying organic matter, are in enormous excess." Further information about this well makes it quite certain that the large excess of chlorine is derived from a basement where salt has been stored for the past eight years. The salt bin is about 100 feet from the well and on higher ground.

No. 409. From a well twelve feet deep, bricked up and cemented to the top; sink-drain and stable thirty; privy and manure heap eighty feet distant. The water tastes and smells badly. This well is used much.

"The examination shows that the water is badly polluted from some source, and I should judge that it is more likely that the source of pollution is the sink drainage, though the distance of the privy, not to say anything of the stable, is not sufficient to exclude possibilities of bad effects from those directions. You felt quite certain that the well could not be polluted from the places which I have mentioned. I would say, however, that no matter in what direction the surface drainage goes we could not be quite so sure of the direction of flow beneath the surface; moreover a well, especially one which is used considerably, acts powerfully upon the surrounding soil in sucking or drawing the drainage toward itself. The water is not safe for drinking purposes."

No. 411. From a well thirteen feet deep; sink drain forty-one, privy forty, stable thirty, and barn-yard thirty-six feet distant; soil clayey loam, and subsoil clay.

No. 412. Another city well, on the most thickly built part of State St. The water is badly polluted and utterly unfit for drinking purposes.

Nos. 413 and 414. "It is a relief to find, as I do in these two samples, excellent drinking waters; the water from the spring particularly is chemically very nice and pure. From a chemical point of view there is no fault to find with the water from the well, but I would add that the distance of sixty and seventy-five feet which represents that of the privy and stable is not always sufficient to permanently protect the well from the soakage of polluting matter." The spring is in a pasture twenty-five rods from any building.

Nos. 415 and 416. No. 415. From a spring in a sand-bank on the side of a hill. Privies are situated twenty and thirty feet from it and slops are thrown out indiscriminately around it. "In this sample there is an excess of organic ammonia for a spring water and an enormous excess of free ammonia, and these results, taken together with the large quantity of nitrites and nitrates indicate unmistakably a serious pollution of the spring." No. 416. From a spring below No. 415 and on the shore of Back Bay not far from high water mark. "Taking into consideration the fact that the close proximity of this spring to the salt water margin would account for the excess of chlorine, this water is much better than that from No. 415, in fact, from a chemical point of view alone, disregarding the unfavorable location of the spring, it would be considered a fairly good drinking water Situated as these two springs are, I should look on them with a suspicion of probable bad results if they should continue to be used as sources of drinking water supply, no matter what the chemical results might be. From what has been told me, I should feel very certain that these springs have had something to do with the late prevalence of typhoid fever in your city."

No. 418. Sample of water brought in iron pipe from a spring 150 rods from any building. The location of the spring would justify the applicant in thinking that "it was a beautiful water" and the analysis confirms his belief.

No. 419. From a well twenty-five feet deep; sink-drain fifteen, privy thirty-five, stable and barn-yard seventy and eighty feet distant; soil, loam and clay.

"Enclosed you will find given on a separate sheet, the results of the analysis of the sample of water which you sent. Chemically the water is good and pure, but nevertheless I should not by any means feel certain that the water is safe to drink, particularly since you have had a case of typhoid fever in the house. It is a fact of

which there can be no doubt that a water may prove very satisfactory upon chemical examination and yet may be dangerously infected with the germs of typhoid fever, so minute are they that the total mass of their organic matter cannot be detected by chemical processes which are competent to estimate even parts per million of organic matter. The sink drainage passes much too near the well for safety, and I would urge carrying it past the well in a perfectly tight drain. The privy is also much too near, and it should so be managed that there will be no soakage from it into the earth. With these suggested precautions there is nothing to prevent the well from furnishing water of excellent quality."

Nos. 420 and 421. Shortly after the beginning of the fall term of the Normal School at Gorham, a case of typhoid fever appeared in one of the students. As this student had been out of town during the vacation, and the time between the opening of this term and the beginning of the sickness was less than the usual period of incubation of typhoid fever, it appeared very probable that the infection had been received while away. Nevertheless, there had been some prevalence of diarrhœal diseases, the cause of which was possibly referable to the water supply. No. 420. From the well at Normal Hall, twenty-five feet deep, the last ten feet of which is in a ledge; distance from sink drainage, fifty feet, but it is carried through a tight iron pipe; from privy 120 ft. No. 421. From a well twelve feet deep, situated between two houses, and distance from the sink-drain thirty, privy forty, and stable and barn-yard fifty feet. The water from this well was used by the scholars while at the school building, and when the diarrhœal trouble began, but at the time the sample was taken for analysis recent rains had raised the water. The results of the examinations were not favorable, and the location of the well was such as to justly cast suspicion upon the water.

No. 422. From a well fifty-six feet deep and drilled through ledge over forty feet; house twenty, and privy, stable, and barn-yard fifty feet distant. This is a pure water for drinking purposes, though like most of the Aroostook waters it has a high degree of hardness due to the presence of carbonate of lime.

No. 423. From a spring one-third of a mile from sources of pollution. The water is brought to the house through a lead pipe.

"The enclosed blank will show you that the sample of water which you sent was chemically very pure. The test for lead showed none.

The water is quite hard (15.32, the river waters in the State generally being about 1.95,) and this hardness would be to a certain extent an assurance against lead poisoning, though we cannot say that it is a complete protection against such accidents. As a general thing, hard waters are much less likely to dissolve lead than soft waters are, but occasionally hard waters for one reason and another will take up lead in dangerous quantities. A continuous flow through the pipe as you have is much better and safer than an intermitting flow."

No. 426. From a well eighteen feet deep with three feet of water; sink-drain thirty, privy twenty, and stable ten feet away; soil sandy. In the case of this well sources of pollution are much too near, but nevertheless in the sandy soil the organic matter appears to be pretty thoroughly oxidized. On the other hand we get a large quantity of nitrates into which the organic matter is changed by the process of oxidation, and a much larger quantity of chlorine than there is usually in a soil not polluted. In a well situated as this one is, there is a possibilitiy that at times, this destruction of organic matter by the action of the soil, may not be so well performed, and, consequently, the water will become dangerous to the users.

Nos. 427, 428, 429, and 430. These four samples were from springs in the city of Portland and they were forwarded by the local board of health of that place. The following report was made:

No. 427. From a spring in the corner of the new reservoir. "This water is badly polluted with organic matter, as you will quickly observe by referring to the figures on the appropriate blank. The sample contained much sediment which was left in the bottom of the bottle after decantation. The decanted portion of water used for the analysis was perfectly clear. An examination of the sediment showed that it was very fine sand without a trace of living organic matter which I expected to find. No examination was made with high powers for bacteria."

"No. 428. From a spring in a garden plot below privies, a stable, and a hen-yard. This water is also badly polluted, especially if the proximity of the spring to the salt water did not in part account for the large excess of chlorine. It is also a very hard water, and the total solids is large. Without any chemical examination, the location and surroundings of the spring would be sufficient to render your suspicion of pollution almost a certainty."

No. 429. From a spring in a sand-bank formed by the excavation of the whole side of a hill. Distance from sink-drains and privies above, about 100 feet. The evidences of pollution in this sample are not so marked as in the preceding two, the excess of chlorine, taken together with the large quantity of nitrites and nitrates, would render the spring suspicious, not to say anything of its surroundings.

No. 430. From a spring at the foot of a hill and at the edge of a roadway. None of the usual sources of pollution are very near this spring. This is a much better water than any other of the four, yet the free ammonia is about twice as much as is permissible in water that we would call first-class spring water. The organic ammonia is slightly in access. If it were legally practicable I should think that it would be a measure in the interest of the public health to close up all or nearly all the springs and wells in the city of Portland.

No. 434. From a shallow well thirty-five feet from the sink-drain, sixty feet from the privy, and thirty and fifty feet respectively from stable and pig-pen; the ground is sandy. Cases of typhoid fever had occurred in the house.

No. 435. From a well thirty feet deep, in sandy loam, and situated at a distance of from twenty-five to forty feet from all the usual sources of pollution about farm buildings. There were cases of typhoid fever in the house.

No. 436. From a well in the cellar beneath the house. The well is about seven feet deep; distance of privy, stable, barn-yard and pig-pen forty-four feet. At times an offensive taste and smell. The chemical results show this water to have been badly polluted.

No. 437. From a well ten feet deep; soil clayey; distance of sink-drain 100 feet, and privy, stable, barn-yard and pig-pen thirty feet. Chemically this water is very good and pure,—much better, in fact, than we usually find where sources of pollution are so near, and better, I should be afraid, than we should find if a sample were taken when the water is low in the well.

No. 438. From a well on the side of a granite hill about fifteen rods above the house and other sources of pollution.

No. 439. From a reservoir about seven feet square and seven feet deep in a swale about four rods below a spring where cattle drink during the summer season. This and No. 438, the analyses show are chemically good and pure waters for drinking purposes.

The samples were sent for examination on account of the prevalence of typhoid fever.

No. 443. From a spring three-fourths of a mile from the village and remote from all buildings. "From the results of the analysis of the sample and from your description of the spring and its location I do not see why it would not make an excellent source of supply of drinking water as far as quality is concerned. You will see from the figures which are enclosed that the results are good, and that the water is tolerably soft, perhaps I ought to say quite soft for a spring water. If you wish to determine whether there are seasonal variations in the quality of the water we will make the examinations for you."

No. 444. From a well four feet deep in sandy soil with clayey subsoil; the distance from sink-drain is thirty, privy twenty-five, stable ten, and pig-pen ten feet. "The enclosed blank will give you the results of the analysis of the sample of water. The well is very unfavorably situated and the analysis shows that the water is badly polluted." The health of the family is said not to have been good since using the water and sickness now exists.

Nos. 445 and 446. The former sample is cistern water purposely polluted with common salt, and the latter is the same water after distillation in a patented apparatus, the first portion being rejected.

No. 447. From a well eighteen feet deep in a gravelly soil, distance from sink-drain twenty-two feet; from privy forty, stable sixty-five, barn-yard and pig-pen forty-five feet.

No. 448. A cistern water, decidedly better than the average cistern water.

No. 449. From a driven well, situated twenty feet from the sink-drain, forty-five from the privy, fifteen from the stable. The ground is sandy. This well is badly located even for a "driven" well. The chemical examination disclosed no marked pollution, though it is probable that at times there has been a slight soakage of sewage into the well, since the family has complained that an odor is sometimes perceived "somewhat like dish-water."

Nos. 450 and 451. These samples were taken from two springs, situated in clayey ground. These waters are not of first-class quality, neither are they so bad as to warrant their condemnation without keeping them under observation longer.

No. 452. From a well situated between two houses, one of which is only eight feet from it. The sink-drain and privy are

twenty and twenty-five feet respectively from it. The water is said to come from a vein in the ledge at the bottom of the well. "I should therefore advise, if you are to continue to use the water, the taking of measures to guard against the danger of soakage, especially from the sink-drain and privy. Sink drainage should be carried to a safe distance through pipes which are not leaky, and the best management of the privy would be to adopt some of the dry methods. I send circulars to your address which may be of help to you."

No. 453. From a well fifteen feet deep and ten inches across, bored in swampy ground near a running stream. No sources of pollution are near. "The results are very satisfactory. The water appears to be a very good one indeed for drinking purposes. It is, moreover, a tolerably soft water."

No. 454. From a well twenty-seven feet deep through solid gravel, and ledge for the last ten feet. As possible sources of pollution are the sink-drain, privy, stable, barn-yard, and pig-pen, all within distances ranging from thirty to 120 feet. The water is not really good and pure well water on account of a moderate pollution and quite a high degree of hardness.

No. 455. From a well eighteen feet deep and from two and one-half rods to three and one-half rods from a barn celler, sink-drain, and privy. The ground is very hard gravel.

No. 456. From a well in ground which is gravelly; distance from sink-drain forty feet, privy twenty, and stable seventeen feet. The water is badly polluted.

No. 458. Well twenty feet deep, through "heavy, dark loam"; subsoil, hardpan of yellowish gravel, very fine, but so hard that a pick will hardly penetrate it. Distance of sink-drain and privy thirty-nine and thirty-eight feet respectively, and of stable, barn-yard and pig-pen sixty to seventy feet. "The water is badly polluted and each of the several processes in the analysis shows this. It happens quite frequently that I find that samples of well water from wells passing through a subsoil of very hard gravel or of clay are badly polluted, probably on account of the surface soakage passing downward to the impermeable layer which forms the hard-pan and then along the surface of this directly into the well. The sink-drain and privy, however, are both nearer to the well than would be safe with any soil, though there would not be so much danger with some kinds of ground."

No. 459. From a spring 800 feet from the buildings. "The doctors were right in recommending this water to you for drinking purposes. The results show that the water is good and pure, notwithstanding the rotten log and the frogs which troubled you in getting the sample. If you are to use the spring as a source of drinking water supply, the muck ought to be taken out, in and around the spring, and the spring stoned up, or better, walled up with brick and cemented so that the water would come in only from the quicksand at the bottom. No examination was made of the sample to determine whether it has any medicinal qualities. I only determine that if it is properly taken care of, the spring will furnish good, pure water for drinking purposes."

No. 460. From a well twenty feet deep, taking its water from the surface of a ledge with clayey subsoil and gravelly soil above; distance of sink-drain fifteen, privy twenty, stable and barn-yard thirty, and pig-pen seventy-five feet. Eight feet of water when the sample was taken. When the water is low it does not taste right.

No. 461. Well eighteen feet deep; ground sandy; distance of sink-drain ten, privy twenty-seven, stable and pig-pen forty, and barn-yard twenty-five feet; typhoid fever present. Water has a bad odor at times.

No. 462. From an aqueduct bringing water from a spring one-third of a mile away from the buildings. The water is good and pure for drinking purposes.

Nos. 463 and 464. No. 463 from a well in a cellar, three feet from the sink-drain, twenty-five feet from privy and stable, and thirty feet from pig-pen. The results show that the water is very badly polluted, and it should not be used for any drinking or culinary purposes. It is no wonder that it has "a slick" taste. No. 464. From a well by the roadside containing the town pump. The town drain runs within fifty feet of the well. "You will see that this is a much better water than the other sample, but it is a very hard water and the excess of chlorine, organic ammonia and nitrates show that the water is polluted. As far as its pollution is concerned there could be no objection to using the water after it is thoroughly boiled, and it might be used for a long while unboiled without doing any harm, but there is of course always danger in using such water.

No. 465. From a well in clayey soil; distance of privy fifty, of pig-pen thirty feet; land slopes from the well in all directions. "Chemically it is a fairly good well water, though rather hard."

Nos. 466 and 467. "No. 466. From a spring in a pasture near the edge of a swamp surrounded by pines, maples and alders. The spring is about ten feet in diameter, and four feet deep; it is not affected by rain or drought. This is a very good spring water. The absence of organic matter and the low total solids make it very probable that the supposed medicinal qualities of the spring are due to the chemical purity of the water." No. 467. From a driven well seven feet deep in low, wet ground: distance of sink-drain twelve, privy and stable twenty-five, pig-pen thirty feet. "You will see that the results of this analysis are not so favorable as in the case of the spring water. The organic matter is in excess and, from the location of the well, I should feel very certain that at times the water might be found considerably worse than this examination shows. There would, however, be no objection to your using this well water after it is boiled, and, of course, it might be used for a lengthened period unboiled without harm, but there is always danger from using polluted water."

No 468. From a well drilled forty-two feet in a "solid" ledge,—the solid ledge, however, is somewhat seamy, and the "grain" is perpendicular. The different strata of rock varied much in hardness; thus one day only three and one-half feet were drilled and another day eleven feet. One vein of water was struck at twenty-four feet and another at forty feet; water stands thirty-two feet high in it; water drawn through an iron pipe cemented at the surface of the ledge. The sink-drain and privy are respectively 170 and 200 feet away, but the pig-pen and manure shed are only twelve feet distant.

No. 469. From a well twenty-two feet deep, stoned from the bottom twelve feet, thence upward the wall is of brick laid in cement; distance from stable three feet, sink-drain forty feet, privy thirty-five feet. The ground is very hard clay. Two children in the family were threatened with typhoid fever. The water is not good and at times would undoubtedly be much worse than is here shown. The family was advised not to use the water for drinking purposes.

ADDITIONS TO THE LIBRARY.

During the year 1889 the following books, journals and pamphlets were added to the library of the Board by exchange and purchase.

Books.

Reports and Papers of the American Public Health Association. Vol. XIV.

Transactions of the Sanitary Institute of Great Britain. Vol. VII. 1885-6.

Transactions of the Epidemiological Society of London. New Series. Vols. VI and VII.

Simon. Public Health Reports. Edited for the Sanitary Institute of Great Britain, by Dr. Seaton. London. 1887.

Wanklyn. Water Analysis. London. 1884.

Leffmann and Beam. Examination of Water for Sanitary and Technical Purposes. Philadelphia. 1889.

Sajous. Annual of the Universal Medical Sciences for 1889. 5 vols. Philadelphia.

Starr. Hygiene of the Nursery. Philadelphia.

Index Catalogue of the Library of the Surgeon-General's Office. Vol. X. Washington. 1889.

Medical and Surgical History of the War of the Rebellion. Part Third. 2 vols. Washington.

Lawrence. Accidents and Emergencies. Philadelphia.

Dulles. What to do First in Emergencies.

Morrison. The Ventilation and Warming of School Buildings. New York. 1887.

Arbeiten aus dem Kaiserlichen Gesundheitsamte. Funfter Band. Berlin. 1889.

Liebermeister. The Infectious Diseases. 2 vols. Detroit. 1887.

Francotte. Die Diphtherie. Leipzig. 1886.

Minnich. Ueber den Croup und seine Stellung zur Diphtheritis. Wien und Leipzig. 1889.

Lancry. De la Contagione de la Diphtherie. Paris. 1886.

Hinträger. Der Bau und die innere Einrichtung von Schulgebäuden. Wien. 1887.

Strohmberg. Das Dorpater Gymnasium in Gesundheitlicher Beziehung. Dorpat. 1888.

Key. Schulhygienische Untersuchungen. German translation by Burgerstein. Hamburg und Leipzig. 1889.

Arnould. Noveaux Elements de la Hygiene. Paris.

Riedel. Die Cholera. Berlin. 1887.

Thoinot et Masselin. Precis de Microbie Medicale et Veterinaire. Paris. 1889.

Verhandlungen und Mittheilungen des Veriens für öffentliche Gesundheitspflege in Magdeburg. 1888.

Verhandlungen der Deutschen Gesellchaft fur öffentliche Gesundheitspflege zu Berlin. 1884–1885–1886–1887.

Karmarsch. Technologisches Wörterbuch. Wiesbaden.

Transactions of the Maine Medical Association for 1889.

Transactions of the 56th Annual Session of the Medical Society of Tennessee. Nashville. 1889.

Transactions of the Medical Association of Missouri for 1888.

Transactions of the New Hampshire Medical Society for 1889. Concord.

Transactions of the Vermont State Medical Society. 1887.

Reports.

Twentieth Annual Report of the State Board of Health of Massachusetts. 1888.

Eleventh Annual Report of the State Board of Health of Connecticut. 1888.

Eleventh Annual Report of the State Board of Health of Rhode Island. 1888.

Twelfth Annual Report of the State Board of Health of New Jersey. 1888.

Third Annual Report of the State Board of Health of Ohio. 1888.

Seventh Annual Report of the State Board of Health of Indiana. 1888.

Sixteenth Annual Report of the State Board of Health of Michigan. 1888.

Twelfth Report of the State Board of Health of Minnesota. 1886-88.

Ninth Annual Report of the State Board of Health of Illinois. 1886.

Twelfth Annual Report of the State Board of Health of Wisconsin. 1888.

Fourth Annual Report of the State Board of Health of Kansas.

Second Biennial Report of the State Board of Health of North Carolina.

Ninth Annual Report of the State Board of Health of South Carolina, 1888.

Second Annual Report of the Provincial Board of Health of New Brunswick. 1888.

Sixth Annual Report of the Provincial Board of Health of Ontario. 1888.

Forty-Seventh Registration Report of Massachusetts. 1888.

Report of the Commissioner of Education for 1887 and 1888.

Fourth Annual Report of the Local Board of Health of Portland.

Seventeenth Annual Report of the Board of Health of Boston. 1888.

Annual Report of the Board of Health of Fall River, Mass.

Annual Report of the Board of Health of Taunton, Mass.

Annual Report of the Board of Health of Newburgh, N. Y.

Fourth Annual Report of the Board of Health of Newport, R. I.

Fourth Annual Report of the Board of Health of Hartford, Conn.

Annual Report of the Board of Health of Scranton, Pa. 1888.

Second Annual Report of the Board of Health of Hartford, Conn.

Annual Report of the Board of Health of Lowell, Mass. 1888.

Ninth Annual Report of the Board of Health of Lynn, Mass. 1888.

Eleventh Annual Report of the Board of Health of Augusta, Ga. 1888.

First Annual Report of the Board of Health of Alameda, Cal. 1888.

Thirteenth Annual Report of the Board of Health of Utica, N. Y. 1888.

Annual Report of the Board of Health of Columbus, Ohio. 1889.

Annual Report of the Board of Health of Manchester, N. H.

Annual Report of the Board of Health of Newton, Mass. 1888.

Twelfth Annual Report of the Health Commissioner of St. Louis, Missouri.

Sanitary and other Journals for 1889.

Index Medicus. Detroit and Boston.

The Sanitarian. Brooklyn, N. Y.

The Sanitary News. Chicago.

The Annals of Hygiene. Philadelphia.

The Engineering and Building Record. New York.

The Health Journal. Ottawa.

The Sanitary Record. London.

Public Health. London.

Brooklyn Medical Journal, Brooklyn. N. Y.
Boston Medical and Surgical Journal.
Medical News. Philadelphia.
The Lancet. London.
The Microscope, Trenton. N. J.
The American Monthly Microscopical Journal. Washington.
Archives of Pediatrics. Philadelphia.
Building. New York.
Science. New York.
The Medical Standard. Chicago.
Occidental Medical Times. Sacramento, Cal.
The Satellite. Philadelphia.
The New York Medical Times.
Journal of Comparative Medicine and Surgery. Philadelphia.
The Microscopical Bulletin. Philadelphia.
The Anti-Adulteration Journal. Philadelphia.
Revue D'Hygiene. Paris.
Zeitschrift für Hygiene. Berlin.
Vierteljahrsschrift für öffent. Gesundheitspflege. Braunschweig.
Deutsche Medicinische Wochenschrift. Berlin.
Zeitschrift für Schulgesundheitspflege. Hamburg.
Centralblatt für Bakteriologie und Parasitenkunde. Jena.
Schweizerische Blätter für Gesundheitspflegeg. Zurich.
Giornale della Reale Societa Italiana D'Igiene. Milano.
La Salute Pubblica. Perugia.
The Sanitary Volunteer. Concord, N. H.
Public Health in Minnesota. Red Wing.
Monthly Bulletin of the Iowa State Board of Health.
Bulletin of the North Carolina Board of Health.
Bulletin of the State Board of Health of Tennessee.
Monthly Bulletin of the Connecticut State Board of Health.
Monthly Bulletin of the State Board of Health of Rhode Island.
Monthly Sanitary Record, State Board of Health of Ohio.
Abstract of Sanitary Reports. Washington.
Bulletin of the Agricultural Experiment Station of Nebraska. June. 1889.

Pamphlets.

Brush. Acute Milk Poisoning.
———. Bovine Tuberculosis. Mt. Vernon, N. Y., 1888.

Kretzschmar. Public Health Resorts vs. Institutions for the Treatment of Bacillary Phthisis. Philadelphia. 1888.

———. Dr. Dettweiler's Method of Treating Pulmonary Consumption. Brooklyn. 1888.

Massachusetts Institute of Technology. Laboratory Experiments. Boston. 1888.

Nelson. Extent and Distribution of Consumption in New Hampshire. 1888.

Baker. Recent Advances in State Medicine. Lansing. 1888.

———. The Causation of Cold Weather Diseases.

Spring. Mark Hopkins, Teacher. New York. 1888.

Weigert. Consumption and Its Cure. New York. 1889.

Chadwick. The Present and General Condition of Sanitary Science. London. 1889.

Crampton. Record of Experiments at Des Lignes Sugar Experiment Station. Baldwin, La., 1888.

Wiley. Foods and Food Adulterations. 1889.

Rauch. Water Supplies of Illinois and the Pollution of its Streams. Springfield. 1889.

Hewitt. Public Health a Public Duty. 1888.

Richards, Mrs. Sanitary Science in the Home. 1888.

McClellan. Sewer Gas Traps. Philadelphia. 1888.

Davis. Impurities in Potable Water. Des Moines, Ia. 1889.

Russell. Common Lodging Houses. Glasgow. 1889.

———. The Sanitary Requirements of a Dairy Farm. Glasgow. 1889.

———. Sanitation and Social Economics. Glasgow. 1889.

———. Ticketed Houses of Glasgow.

———. City of Glasgow Fever and Small-Pox Hospital. Belvidere, 1888.

Taylor. Food Products. Washington, 1889.

Carrier. The efficacy of Filters and other Means employed to Purify Drinking Water. 1889.

Canfield. Some Complications of Chronic Endarteritis. Baltimore. 1889.

———. The Bacterial History of Pneumonia.

———. Relation of Dusty Occupations to Pulmonary Phthisis. Baltimore, 1889.

Treat. Sanitary Entombment.

Hardy. Fresh Water Algae of Maine.

Ziegler. Die Analyse des Wassers.

Kraepelin. Die Fauna der Hamburger Wasserleitung.

Seitz. Der Abdominal typhus nach langjahriger Beobachtung. Stuttgart, 1888.

Heubner. Die Expeimentelle Diphtherie. Leipzig, 1883.

Koch. De Bekampfung der Infectionskrankheiten. Berlin, 1888.

Verhandlungen des Internat. Kongress für Ferienkolonien. Zurich. 1888.

Friere. Statistique des Vaccinations. Paris. 1887.

Gesunde Nahrung. Zurich. 1889.

Moore. Water, Its Impurities, gathered from the Air and Earth, San Francisco. 1888.

Gerhard. Sanitary Condition of Watch Hill.

Clark. Prevention of Consumption. Lansing. 1889.

———. Nuisances. What they are and How to Abate Them. Lansing. 1889.

Mallory. Rafter and Line. On Volvox Globator. As the cause of the fishy taste and odor of the Hemlock Lake water in 1888. Rochester, N. Y.

Bryce. Venereal Disease Among Horses. 1889.

Bibber. Prevention of Yellow Fever in Florida and the South. Baltimore, 1889.

By-Laws of the Local Board of Health of Randolph.

Lowell Water Board. Annual Report for 1888.

Annual Report of the Superintendent of Public Buildings. Chelsea, Mass. 1888.

Report of the Trustees of the Cambridge Hospital. 1888.

Annual Report of the Hatch Experiment Station. Amherst, Mass. 1889.

Thirteenth Annual Report of the Water Commissioners. Taunton, Mass. 1888.

Reports on the Physical Condition of the Police Force of St. Louis.

Report of the State Dairy Commissioner upon Food Adulterations in Minnesota. 1888.

Report of the State Board of Health of Massachusetts on Water Supply and Sewerage. 1888.

Annual Report of the City Physician. Lynn, Mass. 1888.

Public Health Laws. Frankfort, Ky. 1886.

Proceedings of the Quarantine Conference. Montgomery, Ala. March 5, 6 and 7. 1889.

Proceedings and Addresses at the Sanitary Convention. Hastings, Mich. 1888.

Proceedings and Addresses at the Sanitary Convention at Manistee, Mich. 1888.

Report of the Proceedings of the State Board of Health of Kentucky. Annual Meeting. Louisville. May 7, 1889.

Third Annual Report of the Maine Eye and Ear Infirmary. 1888.

Proceedings of the National Conference of the State Boards of Health for 1888.

EXPENSES OF THE BOARD.

The amount and character of the expenditures of the Board for the year 1889 were as follows:

Engraving and drawing	$18 96
Books and sanitary journals	399 34
Instruments	12 00
Paper and stationery	184 75
Postage	175 00
Printing and binding	883 75
Secretary's salary	2000 00
Expenses of members	298 63
Express and telegraph	170 18
Expenses of secretary	81 69
Clerical help	613 00
Chemical and microscopical supplies	33 35
Extra chemical and microscopical work,	53 00
Miscellaneous	71 10
Total	$4994 75

LOCAL BOARDS OF HEALTH

AND

EXTRACTS FROM THEIR REPORTS.

Abbott.

Members of the board: A. P. Race, Secretary; Washington W. Delano, Chairman; Charles Foss.

No cases of the infectious diseases have occurred.

Acton.

Members of the board: O. C. Titcomb, Secretary; C. N. Brackett, Chairman; B. J. Grant.

We had one case of diphtheria.

Addison.

Members of the board: Dr. Fred A. Chandler, Secretary; H. N. Ingersoll, Chairman; U. W. Curtis.

We had three cases of typhoid fever.

Albany.

Members of the board: Daniel Clark, Secretary; Otis Hayford, Chairman; W. York.

One nuisance was reported and it was removed.

Albion.

Members of the board: Dr. C. W. Abbott, Secretary and Health Officer; Otis Meader, Esq., Chairman; R. L. Baker.

One nuisance was removed and three cases of typhoid fever have occurred, one of which ended fatally.

Alexander.

Members of the board: George B. Berry, Secretary; Jones A. Bohanan, Chairman; C. M. Huff.

The secretary reports that he has been on the watch tower, but there have been no infectious diseases.

Alfred.

Members of the board: Dr. F. W. Smith, Secretary; S. M. Came, Chairman; Dr. J. F. Day.

Alna.

Members of the board: Dr. A. M. Card, Secretary; Benj. W. Donald, Chairman; A. B. Erskine.

Four nuisances were reported, all of which were removed. No cases of the infectious diseases were reported.

Alton.

Members of the board: Dr. A. H. Twitchell, Secretary; Charles Clayton, Chairman; A. J. Hatch.

Ten cases of typhoid fever occurred, two of which were fatal. Three of these cases were brought from the boom house on the river where they had been running logs to another house containing a family of father, mother and seven children. The mother and six children contracted the fever. The fever showed much irregularity in its course and symptoms. My horse and several others in the neighborhood had a disease resembling very much influenza in human subjects.

Amherst.

Members of the board: Dr. Geo. A. Lord, Secretary; Nathan Sumner, Chairman; Frank Foster.

No cases of the more serious contagious diseases have occurred.

Andover.

Members of the board: Geo. O. Huse, Secretary; Dr. W. W. Barnes, Chairman; Stephen Cabot.

We had one fatal case of typhoid fever.

Anson.

Members of the board: Reuben Fairbrother, Secretary; Dr. C. M. Wing, Chairman; Byron Hutchins.

About ten nuisances were abated under the direction of the board. We had three cases of scarlet fever, all ending in recovery, and three cases of typhoid fever, one of which ended fatally.

Appleton.

Members of the board: Dr. Frank A. Gushee, Secretary; A. A. Linnekin, Chairman; S. B. Ripley.

Two cases of typhoid fever occurred.

Argyle.

Members of the board: J. N. Tracy, Secretary: S. J. Bussell, Chairman; S. L. Freese.

Three nuisances were removed. We have had nine cases of typhoid fever.

Arrowsic.

Members of the board: J. McFadden, Secretary; T. J. Rairden, Chairman; C. T. Willis.

Ashland.

Members of the board: Charles L. Dunn, Secretary; Dr. E. A. Duren, Chairman; J. H. Carter.

Seven cases of typhoid fever have occurred.

Athens.

Members of the board: Howard C. Taggart, Secretary; Dr. Jas. S. Tobey, Chairman; L. N. Ellingwood.

We have had no cases of the infectious diseases. Our health officers are ready and willing to act in case of need, but it has been quite a healthful year.

Auburn.

Members of the board: Dr. J. W. Beede, Secretary; H. Lowell, Chairman; Daniel Lara.

Augusta.

Members of the board: Dr. R. J. Martin, Secretary and Health Officer; Dr. J. O. Webster, Chairman; E. R. Bean.

Several sewers have been added or extended and some imperfect ones re-laid. Seventy-five nuisances have been reported to the board, and sixty have been abated. There have been reported to the board forty cases of diphtheria, of which four ended fatally, and eighteen cases of typhoid fever with two deaths. One primary and intermediate school was closed on account of diphtheria in that district.

The French district is unhealthy on account of the crowded condition of the tenements. The sanitary measures which are desirable are increased sewerage facilities, and the enforcement of the law regarding crowded tenements.

AURORA.

Members of the board: A. E. Mace, Secretary; G. T. Giles, Chairman; George R. Crosby; Dr. Geo. A. Lord, Health Officer.

We had two cases of typhoid fever.

AVON.

Members of the board: J. A. Badger, Secretary; Joel Wilbur, Chairman; N. E. Gould.

Two cases of typhoid fever occurred with one death.

BAILEYVILLE.

Members of the board: John D. Lawler, Secretary; George W. Libby, Chairman; James G. Smith.

There were no cases of the infectious diseases.

BALDWIN.

Members of the board: Dr. L. Norton, Secretary; I. S. Chase, Chairman; Charles Rounds.

We have had no cases of the infectious diseases.

BANGOR.

Members of the board: John Goldthwaite, Secretary; Dr. D. A. Robinson, Chairman; Dr. A. R. Taney.

About seven thousand feet of sewers have been laid during the year, and about one hundred nuisances have been reported and abated. We have had four mild cases of scarlet fever; twenty-eight

cases of diphtheria with ten deaths, and one hundred and sixty cases of typhoid fever with forty deaths.

Baring.

Members of the board: Joseph Stevens, Secretary; Jas. B. Woodcock, Chairman; Jas. Tyler.

One case of typhoid fever occurred.

Bath.

Members of the board: Dr. E. M Fuller, Secretary; Dr. R. D. Bibber, Chairman.

Since the introduction of Thompson's brook water, typhoid fever has almost entirely disappeared from our midst. In the majority of cases which have occurred, the disease has been contracted from some source foreign to our city.

Many nuisances have been abated, and, in most cases, there has been pleasant and speedy co-operations on the part of all in the correction of conditions detrimental to health. The citizens are paying more attention to their out buildings, and general surroundings and shown many instances of thoughtful care in endeavoring to throw around themselves and others better conditions of sanitation. A few streets have been well drained, and many citizens, in conjunction with the Street Commissioner have improved the sanitary conditions of their premises and the streets in a marked degree.

The Street Commissioner has always worked in harmony with the board in endeavoring to abate all nuisances coming under his jurisdiction. If the same policy is maintained every year, many of the streets will be drained, so that the individual expense will be comparatively small, and the health of the city will be improved.

The number of deaths which occurred in Bath in 1889 was 160, making a death-rate on a basis of 8,000 inhabitants, of 20 per thousand. The following are some of the causes of deaths with the number that occurred from each: consumption, 22; pneumonia, 14; typhoid fever, 5; diphtheria, 2; cholera infantum, 13; cancer, 8; heart disease, 12; paralysis, 11; accident, 7; old age, 5; tetanus, 1.

The deaths per each month were as follows: January, 11; February, 11; March, 19; April, 4; May, 20; June, 9; July,

14; August, 20; September, 13; October, 8; November, 17; December, 14.

Beddington.

Members of the board: Asa F. Libby, Secretary; Wm. A. Coffin, Chairman; Eli Oakes; Dr. S. J. Milliken, Health Officer.

Six cases of diphtheria occurred with one death. The schools and meetings were stopped and infected houses were placarded.

Belfast.

Members of the board: L. T. Shales, Secretary; H. P. Thompson, Chairman; Dr. S. W. Johnson, Health Officer.

A plan for the sewerage of the city has lately been received and work will probably begin in the spring. Twelve nuisances have been reported, all of which have been removed.

Of contagious diseases we have had one case of diphtheria, two of scarlet fever, and three of typhoid fever, but no deaths resulted.

Belgrade.

Members of the board: Dr. L. E. Reynolds, Secretary; E. F. Yeaton, Chairman; Greenleaf Hersom.

We have had two cases of diphtheria and three of typhoid fever, with no deaths from either disease.

Belmont.

Members of the board: Miles Pease, Secretary; N. B. Allenwood, Chairman; D. A. Greer.

We had one case of scarlet fever; the house was placarded and every precaution was taken.

Benedicta.

Members of the board: John Rush, Secretary; J. J. Curran, Chairman; John Sullivan.

We have had no cases of the infectious diseases.

Berwick.

Members of the board: Dr. P. B. Young, Secretary; Dr. H. V. Noyes, Chairman; C. M. Guptill.

Seven nuisances were reported to the board, all of which were removed. Three cases of typhoid fever occurred.

Bethel.

Members of the board: Dr. C. D. Hill, Secretary; E. B Goddard, Chairman; A. B. Goddard.

Biddeford.

Members of the board: Daniel Cote, Secretary; James Beaumont, Chairman; Arthur Simpson.

Bingham.

Members of the board: T. F. Houghton, Secretary; J. D. Merrill, Chairman; Dr. A. A. Piper, Health Officer.

We had one case of diphtheria and four cases of typhoid fever, with one death from the latter cause.

Blaine.

Members of the board: Fred F. Lowell, Secretary; Jona. Hersom, Chairman; J. M. Ramsey.

Three cases of typhoid fever, one of which was supposed to have been caused by well water polluted by the barn-yard. The disinfectants recommended by the State Board of Health were freely used and the circulars were distributed to the families. There has been but little work for the board, but it is ready to act promptly when required.

Blanchard.

Members of the board: E. P. Blanchard, Secretary; C. B. Packard, Chairman; W. H. Knapp.

There have been no cases of contagious diseases.

Bluehill.

Members of the board: Dr. R. P. Grindle, Secretary; A. C. Osgood, Chairman; R. G. Lord.

Three nuisances were reported to the board, one of which was abated, and the other two were not in the opinion of the board found to be nuisances.

There have been one fatal case of diphtheria, seventeen cases of scarlet fever, all recovering, and fourteen cases of typhoid fever, two of which died. Scarlet fever broke out in the district of South

Bluehill in January. Before our board of health was aware of it, the disease had extended into four or five families. The board at once took measures as directed to confine it, and the people in the district, particularly the parents of the children that were sick, assisted greatly, which prevented it from spreading into other districts in town. For the prevalence of typhoid fever we are unable to assign a cause.

BOOTHBAY.

Members of the board: Dr. Alden Blossom, Secretary; J. R. McDougal, Chairman; Byron Giles.

This town has been highly favored in having but a very few cases of contagious diseases. There have been one case of scarlet fever and five of "scarlet rash" in one family. We have never had a season before with so few cases of bowel complaint.

BOOTHBAY HARBOR.

Members of the board: Dr. F. H. Crocker, Secretary; Dr. J. A. Carter, Chairman; W. H. Reed.

We have had no prevailing epidemic of any of the contagious diseases. A few cases of diphtheria and scarlet fever appeared at widely separated periods. The origin was difficult to determine. Generally the cases were not fatal: by proper management and precautions they were limited to the localities in which they were discovered. There have been a few cases of typhoid fever, most of which were imported from the large cities where poor drinking water was, no doubt, the cause. Our sanitary and hygienic conditions compare favorably with other coast towns and the death rate has been about the average as for a number of years past.

BOWDOIN.

Members of the board: A. P. Small, Secretary; T. W. Skelton, Chairman; D. A. Coombs.

We have had two cases of typhoid fever with one death.

BOWDOINHAM.

Members of the board: Dr. I. C. Irish, Secretary; Dr. Charles ———, Chairman; L. B. Small.

Bradley.

Members of the board: A. E. Perkins, Secretary; Eugene Lenfest; Fred C. Barton.

We had four cases of typhoid fever with three deaths. One of the boys in the affected family with his father had worked a part of the time in Oldtown, and it was uncertain whether the infection was contracted there or from the well water at home.

Bremen.

Members of the board: Wm. B. Hilton, Secretary; Warren Weston, Chairman; Solomon Genthner.

No cases of infectious diseases have been reported.

Brewer.

Members of the board: W. H. Gardner, Secretary; Dr. C. P. Thomas, Chairman; E. A. Stanley.

During the year there was an extension of the water supply system by the addition of two or more miles of pipe, and the sewers were extended about three thousand feet. Several nuisances were reported to the board, all of which were removed.

We have had twenty cases of diphtheria with one death, and thirty-two cases of typhoid fever, one only of which ended fatally.

Bridgewater.

Members of the board: R. H. Perkins, Secretary; T. G. Durgin, Chairman; Charles Kidder.

Three nuisances were reported to the board, all of which were removed. Five or six cases of typhoid fever, but no deaths resulted. The cases of fever were mild.

Bridgton.

Members of the board: M. Gleason, Secretary; G. G. Wight, Chairman; Dr. F. A. Mitchell.

Brighton.

Members of the board: L. D. Matthews, Secretary; Asa Strickland, Chairman; G. C. Davenport.

No cases of contagious diseases have been reported.

BRISTOL.

Members of the board: S N Smith, Secretary; George Johnson, Chairman; Dr. Samuel W Johnson.

We have had one case of diphtheria and three of scarlet fever.

BROOKLIN.

Members of the board: E. P. Cole, Secretary; G. R. Allen, Chairman; Dr. F. S. Herrick.

Three nuisances were reported to the board, and these were abated as soon as the attention of the owners was called to them. No cases of contagious diseases have occurred.

BROOKSVILLE.

Members of the board: Jerry Jones, Acting Secretary and Chairman; S. D. Gray.

Two nuisances were removed by the board. We had one case of typhoid fever contracted out of town which ended in recovery. The house was found in good sanitary condition. One family had a diarrhœal disease of a typhoid form. It was contracted by a young son on board a vessel in New York, and affected the other members of the family, causing one death. The case was not reported to the board and no sanitary measures were used. The board is getting better acquainted with its duties and the people with some exceptions are beginning to estimate fairly the value of the health laws, and in most cases show a readiness to comply with the wishes of the local board.

BROWNFIELD.

Members of the board: S. B. Bean, Secretary; A. Blake, Chairman; Dr. H. F. Fitch, third member and Health Officer.

We had one non-fatal case of typhoid fever, and in this, the well was within ten feet of the barn-yard.

BROWNVILLE.

Members of the board: T. W. Pratt, Chairman; M. S. Berry.

There were three cases of diphtheria with one death, and three of typhoid fever in a light form. The report is made by the chairman, as the secretary had resigned on account of illness.

BRUNSWICK.

Members of the board: Dr. M. V. Adams, Secretary; H. J. Given, F. H. Wilson.

About the usual number of nuisances have been removed. I cannot give the number of cases of infectious diseases for they have not been reported to me. A system of sewerage is much needed.

BUCKFIELD.

Members of the board: Dr. J. F. DeCoster, Secretary; Dr. J. C. Caldwell, Chairman; Henry D. Irish.

BUCKSPORT.

Members of the board: Geo. H. Emerson, Secretary; G. W. McAllister, Chairman; E. A. Crocker.

Water has been brought to the village from Great Pond one mile distant and now supplies a part of the village. The system will be extended another year. Several minor nuisances have been reported and removed. We had one case of diphtheria and fifteen of typhoid fever with one death from the latter cause. A proper system of drainage and sewerage is needed.

BURLINGTON.

Members of the board: J. W. Bradbury, Secretary; Mellen Strickland, Chairman; Thomas Shorey.

We have had two cases of scarlet fever and three of typhoid, but no deaths from either cause. Colds among the scholars and teachers in our schools are very common, and we believe as the result of the faulty method of heating and ventilating the houses. A fatal accident occurred in felling trees. Five cases of anthrax in cattle so pronounced by Dr. Bailey, Veterinary Surgeon, occurred. Death resulted very suddenly.

BURNHAM.

Members of the board: A. W. Fletcher, Secretary; Dr. N. E. Murray, Chairman; Dr. W. H. Merrill, Health Officer.

Four nuisances were removed. We had five cases of typhoid fever, three of pulmonary phthisis, and one of acute tuberculosis. Disinfection was practiced in all cases of typhoid fever, and no two

cases occurred in the same family or on any adjacent premises. We would recommend that all school-houses be banked in the fall to prevent the scholars having cold feet and resulting sickness.

Buxton.

Members of the board: Dr. F. A. Southwick, Secretary; Charles Hodgdon, Chairman; J. H. Waterman.

Three nuisances were reported and all were removed. We have had fourteen cases of diphtheria with four deaths, two of scarlet fever, and two of typhoid fever, with one death.

Byron.

Members of the board: H. H. Richards, Secretary; George F. Thomas, Chairman; A. S. Young.

There have been no infectious diseases during the year.

Calais.

Members of the board: Dr. D. E. Seymore, Secretary and Health Officer; C. Ellis, Chairman; Dr. E. H. Vose.

Our water supply is good with an increased number of takers. Thirteen nuisances were reported to the board, and the whole number of nuisances removed, including ill kept privies discovered as the result of the inspections, was eighty-five.

We have had forty-six cases of diphtheria, with twenty deaths, three cases of scarlet fever, and thirteen of typhoid fever. Two cases of typhoid fever resulted from polluted water, the use of which was promptly suppressed and the disease was checked.

Cambridge.

Members of the board: J. B. LaBree, Secretary; J. W. Cole, Chairman: G. E. Bailey.

One case of diphtheria and one of typhoid fever, both in a mild form, occurred.

Camden.

Members of the board: J. P. Wellman, Secretary; Abel Merriam, Chairman; A. Leach.

Five nuisances have been removed. We have had three cases of typhoid fever, of which one proved fatal.

CANAAN.

Members of the board: Dr. L. W. Shean, Secretary; David Nason, Chairman; Dr. Ivory Lowe.

Five nuisances were reported to the board, all of which were removed. Two cases of typhoid fever, one a child of six years.

CAPE ELIZABETH.

Members of the board: Chas. B. Haskell, Secretary; Dr. S. B. Thombs, Chairman; Dr. J. W. Lowell.

One nuisance reported to the board was removed. Eight cases of diphtheria with one death.

CARIBOU.

Members of the board: Dr. J. Cary, Secretary; Rev. C. E. Young, Chairman; C. B. Roberts, Esq.

A new and complete system of water works has been put in since the last report. Water is pumped from the Aroostook River to an elevated stand-pipe from which a supply is distributed to the village. Eleven nuisances reported were all removed upon notice from the board.

Three cases of diphtheria and one of typhoid fever, with one death from the latter cause. A spring in the village near Caribou Stream has furnished germs of typhoid for about every case for the past two years. The spring was so located as to be accessible to surface pollution, and in addition to this, one or two privies are near. The spring gave no trouble during the drought, but the outbreak of typhoid occurred after the first rain.

CARMEL.

Members of the board: F. A. Simpson, Secretary: Henry Kimball, Chairman; W. A. Swan.

We had one case of typhoid fever. As for disease of animals, a two-years-old heifer running alone in the pasture was taken with running sores on the back part of the fore leg. The discharge lasted for a few days and the animal became so weak that she could not walk, and after remaining in that condition for two days more, died. Some other animals were attacked in another part of the town, but they recovered.

Carroll.

Members of the board: Albion Gates, Secretary; H. A. Larrabee, Chairman; W. A. Farrar.

We have had no cases of contagious disease.

Carthage.

Members of the board: S. C. Morse, Secretary; W. W. Goodwin, Chairman; John S. Swett.

No cases of the infectious diseases came to our knowledge.

Casco.

Members of the board: L. W. Holden, Secretary; H. B. Harmon, Chairman; J. D. Spiller.

We have had one case of diphtheria and one case of scarlet fever with no deaths from either disease.

Castine.

Members of the board: Dr. G. A. Wheeler, Secretary; Curtis Stevens, Chairman; Dr. E. E. Philbrook.

One nuisance reported to the board was abated. It has been the healthiest year for eighteen years in this town. One case of typhoid fever is all we have to report.

We ought to have public sewers, and there is an urgent need for pure water. An inspection of all the premises in the village was made in June by the president of the board. [A house to house inspection is one of the best pieces of work that could be done by a local board of health, and many other villages that have not already done so would do well to adopt the same practice.—Sec. St. Bd. of Health.]

Centerville.

Members of the board: Jas. H. Floyd, Secretary; Bion L. Drisko, Chairman; Henry W. Foster.

One nuisance was removed. Six cases of scarlet fever, one of which was fatal.

Charleston.

Members of the board; O. L. Smith, Secretary; Dr. George D. Cook, Chairman and Health Officer; Wm. E. Dunning.

We have had no cases of infectious disease.

CHARLOTTE.

Members of the board: B. J. Fisher, Secretary; Enoch Fisher, Chairman: F. J. Sprague.

No cases of infectious diseases reported.

CHELSEA.

Members of the board; A. N. Douglass, Secretary; W. T. Searles, Chairman; A. A. Sampson.

Eleven cases of scarlet fever with one death, and two of typhoid, also with one death.

CHERRYFIELD.

Members of the board: Dr. C. J. Milliken, Secretary; Daniel Willey, Chairman; Samuel Ray.

We have had one case of diphtheria and one fatal case of typhoid fever.

CHESTER.

Members of the board: A. B. Brown, Secretary; E. L. Kenn, Chairman; Abram Libby.

We have had no infectious diseases except whooping-cough, and this caused the death of two infants.

CHESTERVILLE.

Members of the board: Dr. B. F. Makepeace, Secretary; Edward A. Hall, Chairman; T. J. Clough.

Three nuisances reported to the board were all removed. There were four cases of typhoid fever with one death.

CHINA.

Members of the board: Dr. G. J. Nelson, Secretary; E. M. Dowe, Chairman; C. E. Dutton.

The one nuisance reported to the board was removed. We had two cases of typhoid fever causing one death. In one school unhealthy conditions exist owing to a poor school-house and its unsanitary location.

CLIFTON.

Members of the board: W. D. Campbell, Secretary; S. W. Bowden, Chairman; H. G. Doble.

We had two cases of diphtheria one of which was fatal.

COLUMBIA.

Members of the board: John E. Stewart, Secretary; Asoph Leighton, Chairman; A. J. Tabbott.

One nuisance was abated, but there have been no cases of contagious diseases. It has been a very healthful year.

COLUMBIA FALLS.

Members of the board: E. F. Allen, Secretary; J. F. Pineo, Chairman; C. C. Bucknam.

Three nuisances reported to the board were removed. We had ten cases of diphtheria with three deaths, and two cases of typhoid fever, both of which were fatal.

CONCORD

Members of the board: E. O. Vitton; C. R. Ellis; Amon Savage.

COOPER.

Members of the board: Edwin C. Leland, Secretary; David Howe, Chairman; Wm. W. Sadler.

No cases of infectious diseases occurred.

CORINNA.

Members of the board: A. K. Currier, Secretary; E. Folsom, Chairman; J. C. Pease.

There were six cases of typhoid fever, but no deaths resulted.

CORINTH.

Members of the board: Dr. E. H. Stanhope, Secretary and Health Officer; Dr. C. S. Philbrick, Chairman; Ira W. Davis.

One case of typhoid fever ending in recovery.

CORNISH.

Members of the board: F. C. Small, Secretary; Dr. Wm. B. Swasey, Chairman; B. F. Haley; Dr. Wm. H. Pendexter, Health Officer.

We have the best of opportunities for sewerage and that is what we need very much, and, if the town would put it in, our sanitary condition would be first-class.

Cornville.

Members of the board: D. S. Willey, Secretary; C. E. Smith, Chairman; C. C. Kinsman.

We had four cases of scarlet fever, but no deaths from this cause.

Cranberry Isles.

Members of the board: Wm. P. Preble, Secretary; Wm. E. Hadlock; John Gilley.

We had three mild cases of diphtheria. One cow died from a disease causing swellings in the head. It is generally very healthful here.

Crawford.

Members of the board: J. P. Jeffrey, Secretary; M. S. Fenlason, Chairman; Robert Wallace.

One fatal case of typhoid fever occurred. There have been a few cases of swine disease in which the animals are taken with red spots, weakness and costiveness.

Cumberland.

Members of the board: Dr. C. T. Moulton, Secretary and Health Officer; Albert H. Grannell, Chairman; L H. Merrill.

Three nuisances reported to the board were removed. All the specified contagious diseases have been absent.

Cushing.

Members of the board: A. R. Rivers, Secretary; W. A. Rivers, Chairman; F. C. Hathorn.

We had two fatal cases of typhoid fever. Drainage is needed in some places and the wells should be better protected against surface soakage.

Cutler.

Members of the board: C. G. Aldrich, Secretary; M. W. Ackley, Chairman; O. A. Davis.

We have had no infectious diseases except one case of scarlet fever.

Damariscotta.

Members of the board: Dr. J. M. King, Secretary; Asa H. Snow, Chairman; Dr. E. F. Stetson.

None of the specified contagious diseases have come to our attention, excepting sixteen cases of scarlet fever, all of which recovered.

Danforth.

Members of the board: Dr. M. L. Porter, Secretary; Dr. J. P. Ker, Chairman; James Carson.

Eleven nuisances were reported to the board, ten of which were abated. Four cases of typhoid fever, two fatal.

Dayton.

Members of the board: Dr. George Sylvester, Secretary; Albert Dow, Chairman; Cyrus Ricker.

We had one fatal case of diphtheria which assumed the croupous form, and one non-fatal case of scarlet fever. We had also one fatal case of cerebro-spinal meningitis. The ventilation of the school-houses in this town is bad.

Deering.

Members of the board: Geo. P. Sherwood, Secretary; Dr. A. P. Topliff, Chairman; Andrew Hawes.

Eight nuisances were reported to the board, all of which were abated. We have had six cases of diphtheria, one of which ended fatally, and eleven cases of typhoid fever, with three deaths from this cause. In all cases of infectious diseases, the premises have been inspected by the executive officer and the necessary precautions taken.

Deer Isle.

Members of the board: Andrew J. Beck, Secretary; Seth Webb, Chairman; Wilmot B. Thurlow.

We have had during the year forty-five cases of scarlet fever, with one death, and nineteen cases of typhoid fever, two of which ended fatally. The schools were closed on account of the prevalence of scarlet fever. There is need of a better water supply at Green's Landing.

Denmark.

Members of the board: Isaac H. Berry, Secretary; Dr. S. T. Brown, Chairman; Jos. W. Colby.

No cases of the infectious diseases were reported.

Dennysville.

Members of the board: Dr. A. R. Lincoln, Secretary and Health Officer; Benj. Lincoln, Chairman; Geo. W. Kilby.

Two nuisances were abated. One non-fatal case of scarlet fever occurred.

Detroit.

Members of the board: Orville J. Dorman, Secretary; David F. Libby, Chairman; Parker Sawyer.

One nuisance was abated. We had one case of diphtheria and one of typhoid fever, but no deaths resulted from either cause. J. W. Bean has lost some hogs from a disease supposed to be hog cholera, and others are sick at the time of making this report.

Dexter.

Members of the board: G. E. Farnham, Secretary; C. H. Hayden, Chairman; Dr. C. M. Foss, member and Health Officer. Four nuisances were removed. We have had no case of infectious diseases. Better sewerage is needed.

Dixmont.

Members of the board: W. M. Chapman, Secretary; W. H. Toothaker, Chairman; Dr. Homer Benson, third member and Health Officer.

Dover.

Members of the board: Geo. E. Howard, Secretary; J. Q. Lander, Chairman; Dr. J. B. Cochrane.

Durham.

Members of the board: Dr. J. L. Wright, Secretary; J. E. Hasty, Chairman; C. A. Goddard.

One nuisance was removed without the interference of the board. We have had four non-fatal cases of scarlet fever. The cases of scarlet fever were isolated, and no one allowed to pass or repass except the physician in attendance. Complete disinfection was carried out by burning and otherwise, in accordance with the rules laid down by the State Board of Health. The patients were not

allowed to mingle with outside people for five weeks after the disappearance of the eruption.

EASTBROOK.

Members of the board: A. P. Bunker, Secretary; A. W. Googins, Chairman; L. W. Bunker.

We had seven cases of typhoid fever, but no deaths from this cause. These cases all appeared in one family and we provided nurses and kept the public away, and the fever did not spread.

EAST LIVERMORE.

Members of the board: Dr. C. H. Gibbs, Secretary; A. D. Cole, Chairman; C. H. Severy.

Eight nuisances reported to the board were removed. We had four cases of typhoid fever. One case of tuberculosis occurred in a cow.

EAST MACHIAS.

Members of the board: Dr. J. E. Tuell, Secretary; A. J. Hanscom, Chairman; F. H. Wiswell.

Of the specified infectious diseases, we had only one case of non-fatal typhoid fever. In connection with this case of typhoid fever the following conditions were found: A privy made by digging a square hole three feet deep in the ground and building a light frame house over it, was found situated just at the head of a small ravine leading to the river. This ravine carried the surface drainage to the river, and the privy was not more than five rods from the river bank, near which, and just at the foot of the ravine, a spring broke through the ground. From this spring the family procured water for drinking purposes. A strict quarantine was placed on that spring, the proper precautions in regard to the excreta were observed, the patient recovered, and no other case of the disease occurred.

EASTON.

Members of the board: Dr. D. G. Luce, Secretary; Dura Stanchfield, Chairman; W. H. Rackliffe.

We had one fatal case of diphtheria, and two non-fatal cases of typhiod fever. In addition whooping cough and rötheln were prevalent.

During August and September we had an unusual epidemic of diarrhœal diseases; there were about thirty cases of acute ileo-colitis,

cholera infantum, and dysentery. Four deaths resulted from dysentery and this disease appeared to be of a very malignant type. I should advise disinfection of the stools in cases of dysentery. In one family where I attended eight cases of this disease, the first was in a grown-up daughter who came from a neighboring town; she had no medical attendance for a few days, and the discharges were thrown into the privy vault. I could account for the subsequent cases in no other way. The water, while not above suspicion, was used by other famllies with no ill results. My experience, during the past year, will lead me to require as much care in the disinfection of the stools in dysentery as in typhoid fever.

EDDINGTON.

Members of the board: John J. Temple, Secretary; Daniel S. Stevens, Chairman; W. W. Eddy.

Two nuisances have been removed by the board. We had one light case of diphtheria and one fatal case of typhoid fever. A horse found to have glanders was ordered by the Cattle Commission to be killed.

EDEN.

Members of the board; Willard C. Higgins, Secretary; O. B. Knowles, Chairman; Chas. R. Clark.

About fifty nuisances were reported to the board and about all of them were promptly removed. There were three cases of diphtheria with one death from this cause, and three cases of scarlet fever, none of which proved fatal. There were a few cases of typhoid fever not reported to the board, and I believe one or two deaths.

EDGECOMB.

Members of the board: Eben Chase, Jr., Secretary; J. A. Merry, Chairman; A. M. Burnham.

EDINBURG.

Members of the board: C. M. Farnham, Secretary; C. W. Eldridge, Chairman; G. H. Eldridge.

There have been no cases of the infectious diseases.

ELIOT.

Members of the board: Albert Lord, Secretary; J. L. M. Willis, Chairman; H. I. Durgin.

One nuisance was abated. Seven cases of diphtheria occurred with five deaths, one case of scarlet fever, and six of typhoid fever with one death. The cases of diphtheria are believed to have originated from a mild case brought from Portsmouth. It is difficult to account for the origin of the typhoid cases as the health conditions were generally favorable. In many places the location of the wells is such that the water supply must be polluted.

ELLSWORTH.

Members of the board: Dr. J. H. Patten, Secretary; Dr. W. M. Haines, Chairman; Dr. J. F. Manning.

Pipes were laid during the season for a water supply. Twenty nuisances were reported to the board, of which fifteen were removed or remedied. We had four cases of diphtheria, two of scarlet fever, and three of typhoid fever, but no deaths resulted from any of these diseases. The water-closet of one of the schools was found in a filthy condition and in accordance with our order a new one was built. We need a system of sewerage.

During the latter part of the summer and early part of the fall, after the streets had been opened in laying the water pipes, many cases of fever occurred more or less of a typhoid type, and cases of fever of the same character occurred through November and December. More cases of typhoid fever or cases presenting more or less typhoid symptoms occurred during the summer and fall of 1889 than for the previous ten years together. We attribute this to the digging up of the streets whereby old drains were laid open. We have now an excellent supply of pure water, and, with a few main sewers which will probably be built the coming season, we think we can still claim in the future, what we have certainly been in the past, one of the healthiest cities in the State. [On account of the resignation of the secretary in the fall, the foregoing report was made by the president.—A. G. Y.]

EMBDEN.

Members of the board: Cephas Walker, Secretary; R. F. Durrell, Chairman; J. W. Morin.

Three nuisances reported to the board were all removed. We have had no cases of the infectious diseases.

ENFIELD.

Members of the board: A. J. Darling, Secretary; P. S. Laing, Chairman; J. R. N. Gilman.

Four cases of nuisance were reported to the board and all of them were removed. We had six cases of diphtheria, with one death, and five cases of typhoid fever. The first case of diphtheria appeared to have been imported from Bangor, and the child died. The funeral services were held in the school-house, and as soon as the board of health were aware what they had to contend with, the school was stopped and the school-house was fumigated. The two houses in which the remaining cases occurred were placarded, the inmates isolated as much as possible, and other precautions taken, and we learned of no further spread of the pest.

The five last cases of diphtheria were undoubtedly all contracted directly from the first, for the two families mingled together constantly, and all the persons subsequently taken sick were present at the sickness and death of the child. All the cases after the first became sick nearly at the same time.

Etna.

Members of the board: S. J. Locke, Secretary; E. E. Sylvester; James Goodell.

One nuisance reported to the board was removed. We have had no cases of infectious diseases. There have been but six deaths in town during the year; one was a suicide, one died of liver disease, and four of old age, the average age of the last four being eighty-five years.

I believe there should be a law requiring every householder or next of kin to report to the secretary of the local board of health the name, age and cause of death of every person dying. Physicians should also be required to report all deaths of persons attended by them, and a report should be made to the State Board of Health every year. The additional expense would not be much and the benefits would be great.

Eustis.

Members of the board: O. A. Hutchins, Secretary; C. D. Stevens, Chairman; F. W. Porter.

The only nuisance reported to the board was abated. We have had no cases of the infectious diseases.

Exeter.

Members of the board: Dr. S. W. L. Chase, Secretary; E. A. Chandler, Chairman; W. L. Hart.

We have had one case of diphtheria ending in recovery, and seven cases of typhoid fever which caused three deaths.

Falmouth.

Members of the board: A. S. Noyes, Secretary; W. K. Swett; H. J. Merrill; Dr. I. E. Hobart, Health Officer.

We have had two cases of diphtheria, three of scarlet fever, and two of typhoid fever, but no deaths have resulted from these causes. All these cases of infectious diseases have occurred on high ground where there is good drainage. Tuberculosis appeared among the stock of one man, but the matter was taken in charge by the Cattle Commissioners.

Farmingdale.

Members of the board: Dr. F. M. Putnam, Secretary; A. C. Stilphen, Chairman; A. McCausland.

Two nuisances were reported to the board, and, in all, five were abated. We had one non-fatal case of diphtheria. Upon the whole the town has been remarkably free from contagious diseases.

Farmington.

Members of the board: Dr. F. O. Lyford, Secretary; S. R. Leland, Chairman; H. W. Lowell.

A local company for domestic water supply has enlarged its works. Some improvements in our sewerage were made. Three nuisances were reported and all were removed. We had one case of diphtheria and one of typhoid fever, both recovering. We need a better system of disposing of the drainage from sinks, and a more frequent removal of the contents of vaults.

Fayette.

Members of the board: H. T. Wing, Secretary; J. H. True, Chairman; A. A. Campbell.

We had three cases of scarlet fever and one of typhoid fever, but with no deaths from either disease. The three cases of scarlet fever were all in one family. Precautions were taken by the local board

of health, and we are happy to say that there was no further spread of this much dreaded disease.

FOREST CITY.

Members of the board: Samuel Hatch, Secretary; J. E. Haley, Chairman; Fred Brannen.

We had one case of typhoid fever, ending in recovery.

FORT FAIRFIELD.

Members of the board: A. C. Cary, Secretary; J. S. Smith, Chairman; L. N. Richards; Dr. A. D. Sawyer, Health Officer.

(This board was re-organized with the present membership February 1, 1890.)

FRANKLIN.

Members of the board: G. H. Rutter, Secretary; O. C. Donnell, Chairman; Henry T. Whittaker.

We have had no cases of contagious diseases.

FREEDOM.

Members of the board: Dr. J. W. Mitchell, Secretary.

FREEMAN.

Members of the board: Abner W. Mayo, Secretary; Nelson Peterson, Chairman; John B. Carville.

One nuisance was removed and we had one case of typhoid fever.

FREEPORT.

Members of the board: E. E. Pinkham, Secretary; J. P. Merrill, Chairman; B. P. Soule.

FRIENDSHIP.

Members of the board: Dr. E. E. Baker, Secretary; Nelson Thompson, Chairman; Cyrus Delano.

FRYEBURG.

Members of the board: E. Ballard, Secretary; Dr. D. L. Lamson, Chairman; Irving Mabry.

One nuisance was removed. We have had no cases of the infectious diseases.

GARDINER.

Members of the board: E. E. Lewis, Secretary; V R. Beedle.

Twenty-eight nuisances were reported, and all but two were removed. We have had eighteen cases of diphtheria with two deaths, and six fatal cases of typhoid fever have come to the knowledge of the board. Cases of diphtheria are isolated and an officer is put in charge of the case until after the fumigation of the premises, which is done under the personal supervision of the secretary in all cases. As regards the schools, we did not know with certainty that any of the diphtheria cases originated in or around the school buildings, but, for fear it might be so, a part of the schools were closed for one week, and the buildings were thoroughly cleansed and fumigated under our immediate supervision. Our school-houses are not as well heated and ventilated as they should or might be.

A complete system of sewerage is becoming absolutely necessary and must be had; without it, the removal of a certain class of nuisances is impossible.

GARLAND.

Members of the board: Dr. F. A. C. Emerson, Secretary and Health Officer; E. L. Oak, Chairman; D. H. Robinson.

We have had two cases of nuisances both of which were removed.

GILEAD.

Members of the board: A. M. Whitman, Secretary; P. Harriman, Chairman; E. Harriman.

Four cases of nuisance were reported and all were removed. For infectious diseases we have had only two non-fatal cases of typhoid fever. One very bad old house was ordered vacated by the board on account of its insanitary condition. There was a swampy frog pond back of it, and the water supply was very badly polluted. A woman who had been living in the house, and whose health was very poor, recovered after leaving it. That dwelling is now unoccupied.

GLENBURN.

Members of the board: John F. Tolman, Secretary; Elisha Hill, Chairman; Hiram N. Parker.

We have had four cases of diphtheria with one death, and one non-fatal case each of scarlet fever and typhoid fever. This town

has been very careless in regard to the care of the privies and vaults at the school-houses.

Glenwood Plantation.

Members of the board: Alonzo Springer, Secretary; John E. Pierce, Chairman; Aaron Austin.

No cases of the infectious diseases have been reported.

Gorham.

Members of the board: G. W. Heath, Secretary; Dr. A. W. Lincoln; C. G. Carver.

Seven cases of nuisances have been reported, all of which have been removed. We have had three non-fatal cases of typhoid fever. To improve the sanitary condition of the town, drainage should be attended to and the water supply from wells should be guarded from pollution by sink-drains, etc.

Gouldsboro'.

Members of the board: T. R. Hammond, Secretary; R. R. Joy, Chairman; Dr. C. C. Larrabee, Health Officer.

We have had no cases of the infectious diseases.

Gray.

Members of the board: Dr. J. F. Rowell, Secretary; Dr. E. T. Andrews, Chairman; Dr. E. A. McCollister.

Four nuisances reported to the board were all removed. We had one non-fatal case of diphtheria and one fatal case of typhoid fever.

Greenbush.

Members of the board: H. F. Harris, Secretary; W. W. Harris, Chairman; M. J. Harris.

We have had nine cases of typhoid fever, with two deaths from this cause. Polluted water was the cause. All the cases of typhoid fever have occurred in the village part of the town, where the soil is sandy and most of the privies are but a short distance away. Many of the wells are under the houses.

Greene.

Members of the board: John E. Sawyer, Secretary; Alden Sawyer, Chairman; Dr. A. Pierce.

We have had no cases of the infectious diseases, excepting one of scarlet fever.

Greenfield.

Members of the board: M. C. White, Secretary; James Doyle; J. Avery.

Greenwood.

Members of the board: W. B. Rand, Secretary; J. A. Fairbanks, Chairman; Wm. Richards.

We have had one fatal case of diphtheria, and two non-fatal cases of scarlet fever.

Guilford.

Members of the board: Z. L. Turner, Secretary; L. H. Whittier, Chairman; Henry Straw.

There have been no cases of infectious diseases.

Hallowell.

Members of the board: Dr. J. M. Eveleth, Secretary; E. W. Maddocks, Chairman; Ira M. True.

No changes or improvements were made in drainage or sewerage; our city government every year appropriates $500.00 or more for sewers, and during the year transfers it to something else. No formal complaints of nuisances have been made to the board, but informal ones have come in, which have been attended to.

There have been twenty cases of diphtheria with four deaths, and three cases of typhoid fever. The experience of the past three years has proved to the board the necessity of putting a watchman over every house where there is a case of diphtheria, and this we have done during the last three months of the year. A better water supply and a good system of sewers are needed.

Hampden.

Members of the board: Dr. W. H. Nason, Secretary and Health Officer; C. F. Cowan, Chairman; W. H. Mayo, Esq.

One nuisance reported to the board was removed. We had eight cases of diphtheria with four deaths, and two cases of typhoid fever, ending in recovery. One death occurred from drowning, in the case of a young man who was taken with cramps while in bathing. The local board of health instructed its health officer to see

the agents of school districts and to have the privy vaults cleansed and kept so.

Hancock.

Members of the board: Alfred B. Crabtree, Secretary; Marcus Mullen, Chairman; Rufus H. Young.

No cases of the infectious diseases were reported.

Hanover.

Members of the board: J. B. Roberts, Secretary; A. T. Powers, Chairman; J. R. Howard.

The water supply has been somewhat improved by a new aqueduct in the village. We have had no cases of the contagious diseases, except chicken-pox which was quite prevalent in the village.

Harmony.

Members of the board: L. S. Reed, Secretary; F. R. Hurd, Chairman; S. Leighton, Dr. F. O. Turner, Health Officer.

We have had no cases of the infectious diseases. A little more care in regard to sanitary conditions around dwellings, I might suggest as a means of improving the healthy conditions of the town, for some are very negligent in this respect. [Noticing that the report of the local board of health of Harmony was not included in last year's annual report, the secretary writes that he certainly made and forwarded a report. We are glad to make this note. —A. G. Y.]

Harpswell.

Members of the board: J. S. Farr, Secretary; G. H. Dearbon, Chairman; John M Stinson.

Three nuisances were removed. There were two case of typhoid fever, one in a mild form and one ending fatally. Our schoolrooms are heated by stoves with the funnel running overhead. When the heat becomes unbearable windows are thrown open and the cold air rushes in, the scholars are attacked with colds and coughs, and, as the result in many cases, have to stay at home, thus losing schooling.

Harrington.

Members of the board: Dr. G. H. Walling, Secretary.

There have been no cases of small-pox, diphtheria, scarlet fever or typhoid fever that I know of in town.

Harrison.

Members of the board: Alphonso Moulton, Secretary; S. L. Weston, Chairman; H. H. Cole.

There has been one case of scarlet fever. The case was isolated and thorough fumigation was done after complete recovery.

One tenement house is unhealthy on account of bad drainage and poor water supply. The trouble has been limited in part, but more remains to be done. Among diseases of animals, we had one case of tuberculosis and two cases of emphysema.

Hartland.

Members of the board: A. W. Miller, Secretary; Dr. E. A. Bean, Chairman; Dr. J. F. Brown.

We had two cases of diphtheria. These two cases of diphtheria occurred on a street running through a low, wet section which appears to affect the water supply, and the people residing there are more subject to ill health than in other places.

Hermon.

Members of the board: Dr. F. P. Whittaker, Secretary; F. A. Bishop, Chairman; Joshua Tuseley.

Five cases of scarlet fever, ending in recovery, and ten of typhoid fever, one of which died.

Hersey.

Members of the board: E. E. Morse, Secretary; L. M. Davis, Chairman; Seth Allen; Dr. B. C. Woodbury, Health Officer.

We have had no cases of the specified infectious diseases.

Hiram.

Members of the board: John Pierce, Secretary; A. R. P. Googins, Chairman; Samuel D. Wadsworth.

One nuisance was removed. We have had two cases of diphtheria, one of which was fatal, and one case of typhoid fever, ending in recovery.

Hodgdon.

Members of the board: Moses Benn, Secretary; Dr. J. V. Tabor, Chairman; Wm. Atherton.

We have had one fatal case of diphtheria and one case of typhoid fever. Diarrhœal diseases prevailed to quite an extent. Our town is very healthy generally.

Holden.

Members of the board: P. L. Pond, Secretary; A. Tirrill, Chairman; George C. Wiswell.

One nuisance was removed. A dead horse was put into a brook which has been used for seventy-five years or more as a public watering place. We have had nine cases of diphtheria and three of typhoid fever, with one death from each cause.

Hollis.

Members of the board: T. J. Carle, Secretary; J. L. Smith, Chairman; Charles Randell.

We have had one case of diphtheria, and one of typhoid fever, fatal. Mumps prevailed to quite an extent in the schools. The infected ones were excluded and none of the schools closed on account of the disease.

Hope.

Members of the board: D. H. Mansfield, Secretary; Dr. Isaac Bartlett, Chairman; Levere Howard.

We have had no cases of the infectious diseases, excepting two or three slight cases of measles.

Houlton.

Members of the board: Dr. Chas. E. Williams, Secretary; L. B. Johnson, Chairman; Dr. Geo. Cary.

The sewerage system has been extended. About fifty nuisances have been investigated and removed. There have been twenty-six cases of diphtheria, with only one death, four of scarlet fever, one of which was fatal, and twelve of typhoid fever with two deaths.

Howland.

Members of the board: O. C. Sweat, Secretary; James O. Davis, Chairman; R. Q. Lancaster.

One nuisance was abated. There have been no cases of the infectious diseases known.

HURRICANE ISLE.

Members of the board: J. J. McCabe, M. H. McIntire.

We have had nine cases of diphtheria with three deatns. Three men and a team were employed in cleaning up places that required it. (As the board has no secretary at present, the report is made by Mr. McCabe.—A. G. Y.)

INDUSTRY.

Members of the board: Dr. Wm. C. Hatch, Secretary; Caleb W. Gilmore, Chairman; H. B. Luce.

We have had no cases of the infectious diseases excepting rötheln. The method of heating is outrageously bad in every school-house in town. More care should be taken in the disposal of offal of slaughtered animals in this town, and a revolution should be made in the arrangement of privy vaults, and greater care taken to secure the purity of water supplies.

ISLAND FALLS.

Members of the board: Geo. H. Donham, Secretary; Alpheus Sprague, Chairman; W. D. Warren.

One nuisance was abated. We have had three cases of diphtheria with one death from this cause. The cases of diphtheria were isolated and after the death occurred the burial was supervised by the board of health. No others were ever allowed about the premises or at the burial.

ISLE AU HAUT.

Members of the board: I. B. Turner, Secretary; James Robinson, Chairman; J. T. Barter.

We have had no cases of the infectious diseases, with the exception of two cases of whooping-cough. We have good water, pure air and good drainage.

ISLESBORO.'

Members of the board: J. A. Sprague, Secretary; Nelson Gilkey, Chairman.

Two nuisances have been abated, and we have had one case of diphtheria which recovered.

JACKSON.

Members of the board: I. D. Gould, Secretary; J. H. Cook; J. B. Jacobs.

We have had no cases of the specified infectious diseases, but measles has prevailed.

JAY.

Members of the board: Warren Leland, Secretary; E. W. Gould, Chairman: S. B. Farnham.

Two nuisances have been removed. We have had two cases of scarlet fever, both recovering, and five cases of typhoid fever resulting in one death. Prompt measures have been taken to prevent the spread of such diseases.

JEFFERSON.

Members of the board: J. J Bond, Secretary; H. W. Clary, Chairman; Dr. A. A. Jackson, Health Officer.

In the case of two nuisances, improvements were made upon request of the board. We have had one case of typhoid fever.

JONESBORO'.

Members of the board: E. M. Watts, Secretary; G. F. Whitney, Chairman; G. E. Noyes; Dr. H. H. Smith, Health Officer.

We have had six cases of scarlet fever, but no deaths resulting, and two cases of typhoid fever in a mild form. Scarlet fever entered one of the schools which was immediately stopped for two weeks.

JONESPORT.

Members of the board: J. W. Peasley, Secretary; Geo. E. Watts, Chairman; E. L. Kelley.

We have had twenty-two cases of diphtheria, causing six deaths. Infected houses have been placarded and intercourse has, as far as possible, been forbidden with everybody, except the attending physician.

KENNEBUNK.

Members of the board: W. L. Dane, Esq., Secretary; Dr. F. M. Ross, Chairman; John Cousens.

Three nuisances have been removed by the board. We have had one case of diphtheria. Pleuro-pneumonia occurred in a herd of cows in February. This has been a healthy year at Kennebunk.

KENNEBUNKPORT.

Members of the board: Wm. H. Cluff, Secretary; Enoch T. Ccleman.

Two nuisances were abated. We have had ten cases of diphtheria, causing two deaths, and five cases of scarlet fever, all of which recovered.

KENDUSKEAG.

Members of the board: Geo. W. Worster, Secretary; M. L. Fisher, Chairman; A. A. Cook.

KINGFIELD.

Members of the board: C. W. Clark, Secretary; W. S. Gilbert, Chairman; W. E. Cummings; Dr. A. G. Howard, Health Officer.

We have had no contagious diseases during the year.

KITTERY.

Members of the board: Dr. L. O. Buzzell, Secretary; Dr. M. F. Wentworth, Chairman; Dr. A. W. Johnson.

We have had no cases of the infectious diseases.

LAGRANGE.

Members of the board: H. W. Blake, Secretary; W. B. Danforth, Chairman; Fred H. Savage.

Lagrange has been remarkably free from disease the past year. We had one case of diphtheria, ending in recovery.

LAMOINE.

Members of the board: W. S. Hodgkins, Secretary; Eben H. King, Chairman; I. N. Salisbury.

One nuisance was abated. We have had one case of typhoid fever, which recovered.

LEBANON.

Members of the board: Dr. J. S. Parker, Secretary; S. D. Lord, Chairman; J. C. Lord.

LEE.

Members of the board: J. M. Daniels, Secretary; A. K. Lewis, Chairman; I. O. Getchell.

It has been very healthy in this town, with deaths only of several aged people.

Leeds.

Members of the board: Henry M. Brewster, Esq., Secretary; Albert Barker, Esq., Chairman; Dr. R. S. Loring.

One nuisance was abated. We have had two cases of scarlet fever and one of typhoid fever, but with no deaths from either disease.

Within the year for which this report is made five cases of diphtheria have occurred resulting in three deaths. (At this writing, January 23, 1890, seven cases with five deaths, all in one family). A woman living in Lawrence, Mass., in the family where one child died with diphtheria, moved to her son's in this town, who had a wife and five children. She brought with her, trunks, carpets, chairs, and a lounge, and in ten or twelve days the youngest child was taken with malignant diphtheria, and a few days later the mother was attacked. In less than a week the other children were down with the disease. The first child was taken December 24th, and died on the 30th; the mother died December 31st; a boy eight years old, January 3rd; a boy five years old, January 8th, and a girl ten years old January 15th. The eldest child, a girl of thirteen recovered. As soon as our board heard of the disease, and before we were notified by the physician, we placed the house in quarantine, and allowed no person to leave the premises and no person to go to the house without permission. After the only child that was left, recovered, we caused the bedding and lounges to be burned and had the house well fumigated with sulphur and the disease has not spread.

Levant.

Members of the board: C. W. Fernald, Secretary; C. M. Page, Chairman; Dr. A. M. Purington, Health Officer.

One nuisance has been abated. No infectious diseases observed.

Lewiston.

Members of the board: C. V. Emerson, Esq., Secretary; Dr. O. A. Horr, Chairman; Dr. J. A. Donovan.

Thirty-one formal complaints of nuisances were made to the board, and a much larger number that were not reported, were abated or remedied. We had thirty-eight cases of diphtheria with

eight deaths, seventy-five of scarlet fever with only three deaths known, and twelve of typhoid fever with three deaths.

We think all deaths should be reported to the local board of health, and that permits for burial or transportation of the dead should issue from the same board. In our city the clerk attends to this, and I presume the clerk in the towns generally through the State do the same. It is believed that the board of health is, or should be, better qualified to know of the risk attendant upon the transportation of those dead of infectious diseases than the clerks of the different towns through the State are. Many reasons exist why the board of health should know when a death in their town occurs. This is especially true in time of epidemic, and when neighboring towns may be affected with contagious diseases.

Liberty.

Members of the board: Dr. E. A. Porter, Secretary; J. O. Johnson, Chairman; W. H. Moody.

One nuisance was removed. We have had no cases of the infectious diseases. The condition of the school-house privies should be looked after more closely.

Limestone.

Members of the board: Dr. A. D. Hatfield, Secretary; E. G. Weymouth, Chairman; Mark Trafton.

We have had fifteen cases of typhoid fever with one death.

Limington.

Members of the board: W. S. Small, Secretary; Dr. J. F. Moulton, Chairman.

Lincoln.

Members of the board: Dr. C. Fuller, Secretary; C. A. Sargent, Chairman; L. E. White.

A reservoir costing $350.00 was built in Main street to supply water for fire purposes. Five nuisances have come to the notice of the board, of which four have been removed. Six cases of diphtheria and seven of typhoid fever have come to the notice of the secretary, with one death from croup in one of the diphtheria cases.

In one case, sickness was apparently caused by the water from a well situated between two barns, and in another instance where

drinking water was taken from an old well near the school-house, many were taken sick. Good drainage should be put in on Main street.

Mr. Spencer lost thirty or forty sheep from a disease caused by a worm or grub in the nose and head.

LINCOLNVILLE.

Members of the board: Dr. E. F. Brown, Secretary and Health Officer, R. B. Sherman, Chairman; Henry A. Pierce.

Improvements have been made in the vaults and sinks in nearly all the houses in town. One nuisance was abated.

We have had two cases of diphtheria with one death, three cases of scarlet fever, and five of typhoid fever, two of which ended fatally.

LINNEUS.

Members of the board: Dr. Robert Boyd, Secretary; R. B. Young, Chairman; George W. Getchell.

One nuisance was removed. We had six cases of typhoid fever of which all recovered; whooping-cough was also quite prevalent.

LISBON.

Members of the board: John W. Jordan, Secretary; A. J. Shaw, Chairman; Henry Hackett; Dr. A. W. Potter, Health Officer.

Twelve nuisances have been reported to the board, all of which have been removed. We need a good sewerage system very much, and also a water supply.

Twelve cases of scarlet fever and three of typhoid fever have occurred. All the patients recovered. Our physicians are all very good about reporting cases of infectious sickness, but I think it very probable that some cases of scarlet fever in the foreign population working in the mills have not come to the notice of the board, on account of the wrong habit which they have of concealing cases.

I think that the people generally agree with me that a board of health is a pretty good institution if it performs its duty.

LITCHFIELD.

Members of the board: Gardiner Roberts, Jr., Secretary; Dr. Enoch Adams, Chairman and Health Officer; Thomas Holmes.

We have had no cases of the infectious diseases. Two cases of tuberculosis have occurred in one herd of cows. Action was taken by the Cattle Commission.

Littleton.

Members of the board: La-Roy F. Hall, Secretary; G. C. Hayward, Chairman; H. A. Hall.

Two nuisances were abated. We have had two cases of scarlet fever and one of typhoid fever.

In connection with contagious diseases we do just what is recommended by the State Board of Health.

Livermore.

Members of the board: W. F. Fuller, Secretary; Dr. G. F. Adams, Chairman and Health Officer; R. B. Bradbury.

We have had one fatal case of diphtheria. Prompt action was taken and the further spread of the disease was prevented.

Lovell.

Members of the board: Dr. C. P. Hubbard, Secretary; J. K. P. Vance, Chairman; W. W. Durgin.

We have had one case of diphtheria which ended in recovery.

Lowell.

Members of the board: J. F. Dam, Jr., Secretary; S. M. Cable, Chairman; J. Varney.

One nuisance was removed. No cases of infectious diseases given.

Lubec.

Members of the board: J. B. Neagle, Acting Secretary; Ira W. Hamilton, Chairman; S. Myers; Dr. E. H. Bennett, Health Officer.

One nuisance has been removed. We have had eleven cases of diphtheria with two deaths, three of scarlet fever with one death, and two cases of typhoid fever ending in recovery.

In the cases of diphtheria in our town we were able to trace them very well. The first case was in a young man who had been visiting at Little Machias and was taken sick the next day after his return, and two young men who spent the evening with him were also taken the following week. The next case was that of a young lady who came visiting in the same neighborhood with mild sore throat, and slept with another young lady who took diphtheria and died; and it was reported that another young lady, with whom she

slept last before coming to our town, died of the same disease. The other cases of diphtheria were in families where they had had diphtheria years before, where the chambers in the houses were unfinished and are used as catch-alls.

The scarlet fever outbreak originated from a servant girl who had the disease two years before at home, and who went home and got an old dress to make over. While at work on the dress the children at the house where she worked were taken sick with scarlet fever, and their mother also took it. The dress had not been used for two years.

Lyman.

Members of the board: Geo. H. Day, Secretary; Dr. E. E. Hurd, Chairman; A. F. Roberts.

A new aqueduct has been laid in place of the old one to supply the village at Goodwin's Mills with water. We have had ten cases of diphtheria with one death, and one non-fatal case of typhoid fever. There is one locality in town where diphtheria usually makes its appearance, if this disease is prevailing in epidemic form. We have endeavored to scatter sanitary intelligence through the town and it has generally been well received.

Machiasport.

Members of the board: Dr. F. L. Shaw, Secretary; E. A. Moore, Chairman; Chas. M. Gates.

We have had about twenty-five cases of diphtheria, three of them ending fatally, strict isolation was carried out as far as possible.

Madawaska.

Members of the board: Eloie Albert, Secretary; Arthur Daigle, Chairman; Michel Albert.

No cases of typhoid fever have come to the knowledge of the board.

Madison.

Members of the board: Chas. W. Dyer, Secretary; Dr. C. D. Morrill, Chairman and Health Officer; John Chadbourn.

One death occurred from scarlet fever and one from typhoid fever. Three nuisances were removed.

I cannot fill this report out as I should like to for our book was burned the last of August, and most of the sickness occurred before that time.

MADRID.

Members of the board: Reuben Sargent, Secretary; Chester Whitney, Chairman; G. E. Moores.

We have not known of any cases of infectious diseases during the year.

MANCHESTER.

Members of the board: G. M. Knowles, Secretary; W. R. Merrill, Chairman; F. J. Hewins.

Not a case of infectious disease has been known in the town.

MAPLETON.

Members of the board: J. C. Chandler, Secretary; J. A. Stewart, Chairman; James McAlpin.

One nuisance was removed. We have had one case of diphtheria and two of scarlet fever.

MARIAVILLE.

Members of the board: M. Kingman, Secretary; George W. Black, Chairman; B. G. Young.

We have had two cases of typhoid fever.

MARION.

Members of the board: B. L. Smith, Secretary; Joseph Thompson, Chairman; F. N. Gardner.

We have had no cases of the infectious diseases.

MARSHFIELD.

Members of the board: I. W. Foss, Secretary; L. B. Thaxter, Chairman; Thomas Berry.

We have had one slight case of scarlet fever.

MASARDIS.

Members of the board: F. H. Knowlen, Secretary; S. W. Clark, Chairman; F. W. E. Goss.

MASON.

Members of the board: A. H. Witham, Secretary; E. Hutchinson, Chairman; H. G. Mason.

We have had no cases of the infectious diseases. (The above report was made by the chairman of the selectmen, who says that the secretary and chairman of the board have moved away and a new board will be appointed in the spring.—A. G. Y.)

MATTAWAMKEAG.

Members of the board: Alex. Thompson, Secretary; Alex. McLain, Chairman.

MAXFIELD.

Members of the board: Geo. Emery, W. S. Lancaster.

MEDDYBEMPS.

Members of the board: J. S. Bridges, Secretary; Charles L. Hatter, Chairman; S. J. Allen.

We have had no contagious diseases in town this year.

MEDFORD.

Members of the board: S. O. Dinsmore, Secretary; W. S. Lovejoy, Chairman; D. A. Hathorne.

We have had no contagious diseases.

MEDWAY.

Members of the board: C. A. DeGrass, Secretary; N. A. Powers, Chairman; G. L. W. DeGrass.

Three nuisances have been removed. There have been no contagious diseases.

MERCER.

Members of the board: Dr. V. R. Perkins, Secretary; John Bunker, Chairman; Eli Wells.

There have been six cases of typhoid fever with three deaths. Measles and whooping-cough have also been prevalent.

MEXICO.

Members of the board: H. W. Park.

There have been no cases of diphtheria, scarlet fever or typhoid fever. Three deaths (adults) occurred last spring all in one family. It was supposed to have been from typhoid-pneumonia. We have been having for some weeks past a disease affecting the eyes, the

scholars in our schools being thus affected. The eyes become red, much inflamed, and in severe cases, of which there have been many, it would require much bathing to get the eyes open after a night's sleep.

MILLBRIDGE.

Members of the board: Dr. George Googins, Secretary; Dr. George H. Sawyer, Chairman; L. G Means.

We have had two cases of typhoid fever, with one death. We need an improvement in our drainage and a better water supply in certain localities.

MILFORD.

Members of the board: M. W. Sawyer, Secretary; M. A. Austin, Chairman; F. P. Olliver.

Three nuisances have been removed. Seven cases of typhoid fever with one death have occurred.

MONROE.

Members of the board: Dr. J. J. Sewall, Secretary and Health Officer; F. Atwood, Chairman; E. H. Nealley.

Two nuisances were abated. We have had one case of scarlet fever and four of typhoid fever. There was one death among the typhoid patients, whooping-cough has also been prevalent.

MONTICELLO.

Members of the board: G. W. Lowell, Secretary; M. J. Hogan, Chairman; Enoch Robertson.

There have been three cases of scarlet fever with one death, and one case of typhoid fever.

MONTVILLE.

Members of the board: Dr. A. D. Ramsey, Secretary; B. T. Foster, Chairman; J. W. Collins.

Four nuisances have been abated. Two cases of typhoid fever have occurred, one of which was fatal. Both cases of typhoid were caused by drinking stagnant water, or, at least, I could find no other cause.

MORRILL.

Members of the board: Dr. J. W. Pearson, Secretary; B. A. Hatch; D. O. Bowen.

MILO.

Members of the board: A. W. Murray, Secretary; M. L. Durgin, Jr., Chairman; Dr. H. Hamlin.

There have been one case of diphtheria and two of typhoid fever.

MINOT.

Members of the board: Dr. C. M. Cobb, Secretary; Charles F. True, Chairman; C. H. Tobie.

Four nuisances have been removed. We have had two cases of diphtheria and nine of typhoid fever. We need a water supply and sewerage.

MONMOUTH.

Members of the board: J. H. Norris, Secretary; Dr. D. E. Marston, Chairman.

We have had ten cases of scarlet fever and two of typhoid fever, but no deaths have resulted from either disease. Prompt measures have been taken to prevent the spreading of infectious diseases.

MONSON.

Members of the board: Dr. C. W. Ray, Secretary; F. J. Wilkins, Chairman; S. P. Bray.

Several nuisances were reported and all were removed. We have had two non-fatal cases of typhoid fever. We made a general examination of premises and suggested changes for improvements; the suggestions were followed.

MOSCOW.

Members of the board: A. Burke, Secretary; C. M. Hill, Chairman; Thomas Emerton.

One nuisance was promptly removed. No contagious diseases have been reported. The water supply in some instances is bad and changes should be made. In one case the water comes underground from a stagnant frog pond, runs under the barn and hog-house, and then supplies a well on the lower side of the house. The sink-spout from the kitchen is also very near the well. The woman living there is sick nearly all the time.

Mt. Chase.

Members of the board: E. A. Cooper, Secretaiy; John Sargent, Chairman; L. S. Tozier.

One case of diphtheria occurred.

Mt. Desert.

Members of the board: S. M. Nash, Secretary; B. T. Atherton, Chairman; W. S. Smallidge.

One nuisance was abated. We have had four cases of diphtheria, two of which were fatal. The board has surveyed the sanitary condition of all the public buildings and hotels and suggested some changes, but on the whole found them in very good condition.

Mt. Vernon.

Members of the board: Dr. Silas Burbank, Secretary; Rufus F. Fletcher, Chairman; James A. Robinson.

We had one case of diphtheria and three of typhoid fever, but no deaths from either disease. If I were to suggest anything in the way of improvements in the sanitary condition of the town it would be more care as regards ventilation and water supply.

Naples.

Members of the board: P. O. Cannell, Secretary; G. W. Hall, Chairman; Dr. C. Y. Lord.

One nuisance was removed and we have had two cases of typhoid fever ending in recovery.

Newburgh.

Members of the board: C. H. Whitcomb, Secretary; B. D. Newcomb, Chairman; Dr. F. O. J. S. Hill, Health Officer.

We have had five cases of typhoid fever, ending in recovery. Prompt action has been taken to prevent the spreading of infection.

Newcastle.

Members of the board: D. S. Glidden, Secretary; Dr. R. C. Chapman, Chairman; S. D. Wyman.

We had one case of diphtheria.

NEWFIELD.

Members of the board: I. M. Trafton, Secretary; T. E. Mitchell, Chairman; C. L. Wentworth.

We are a favored people and have had no cases of the infectious diseases.

NEW GLOUCESTER.

Members of the board: Dr. John I. Sturgis, Secretary; M. C. Clark, Chairman; Wm. H. True.

One case of diphtheria occurred, ending in recovery.

NEWPORT.

Members of the board: Frank M. Shaw, Secretary; R. H. Libby, Chairman; Dr. A. I. Harvey, Health Officer.

We have had one slight case of diphtheria, and six cases of typhoid fever with one death from this cause at the date of making this report. Three of the cases were imported from Bangor, and in one of these cases, a young lady communicated the disease to her father.

NEW PORTLAND.

Members of the board: Dr. W. H. Stevens, Secretary; Dr. S. A. Bennett, Chairman; Abel Thompson.

One nuisance was abated. We have had two non-fatal cases of typhoid fever. A more intelligent care of privies and sink-slops would improve the sanitary condition of our town. The board looks after the conditions of water supply and privies, and advises with parties that should be interested.

NEWRY.

Members of the board: W. B. Wight, Secretary; C. H. L. Powers, Chairman; H. M. Kendall.

No cases of infectious diseases have been present.

NEW SHARON.

Members of the board: D. R. Hargraves, Secretary; James Jewell, Chairman; D. J. Jordan.

Two nuisances have been reported, one of which has been removed, and the other did not prove to be a nuisance in fact. We have had three cases of typhoid fever with two deaths.

New Sweden.

Members of the board: John Jacobson, Secretary; O. P. Fogelin, Chairman; Olop Anderson.

One nuisance was removed. There were no cases of the infectious diseases.

New Vineyard.

Members of the board: George H. Pratt, Secretary; A. D. Turner, Chairman; M. V. B. Hardy.

Three nuisances were reported to the board and all were removed. There have been no cases of the infectious diseases.

Nobleboro'.

Members of the board: J. M. Winslow, Secretary; Wm. H. Moody, Chairman; Albert Cunningham.

We have had one case of diphtheria and one of typhoid fever, the latter of which proved fatal. Greater cleanliness as regards the management of the privy and more care of the sink drainage would improve the sanitary condition of many of the houses.

Norridgewock.

Members of the board: Dr. P. S. Lindsey, Secretary; A. O. Frederic, Chairman; Henry Murphy.

We have had two nuisances to deal with, one of which we have removed. The other was occasioned by too many sink-spouts and water-closets in close proximity to each other, and no drainage for them. It was not removed, because no mode of removal could be decided upon.

We have enjoyed unusually good health the past year, and no cases of the infectious diseases have been reported.

Northfield.

Members of the board: F. H. Smith, Secretary; Jas. McReavy, Chairman; C. Gardner.

North Haven.

Members of the board: B. C. Calderwood, Secretary; O. B. Kent, Chairman; J. C. Webster.

It has been a very healthy year and no cases of the infectious diseases have been reported. One nuisance was reported, but was not abated.

Northport.

Members of the board: M. C. Hill, Secretary; F. A. Rhoades, Chairman; John R. Hurd.

We have had three cases of diphtheria with one death. The diphtheria was caused by bad plumbing in a house in Belfast where a Northport girl worked.

North Yarmouth.

Members of the board: S. H. Sweetsir, Secretary; N. H. Jewett, Chairman; Dr. Wm. Osgood, third member and Health Officer.

One nuisance was abated. We have not had a case of any of the infectious diseases in town. I have not heard of the occurrence of any diseases among animals until lately, when rumor says that one hog died from hog cholera.

Norway.

Members of the board: E. F. Smith, Esq., Secretary; Dr. B. F. Bradbury, Chairman; E. H. Brown.

Two nuisances were reported, one of which was removed. The one not removed was that of a meadow or low lands above the falls, the character of which is well known to you.

We have had two cases of diphtheria and one of typhoid fever, but no deaths occurred from these causes. One case of glanders occurred in a horse. We need very much a complete system of sewerage.

Oakland.

Members of the board: H. W. Wells, Secretary; G. W. Hubbard, Chairman; Dr. M. S. Holmes, Health Officer.

One nuisance was abated. We have had one fatal case of diphtheria, and three cases of scarlet fever, all of which recovered. Two deaths occurred by drowning while in bathing. We have need of better drainage.

Old Orchard.

Members of the board: W. G. Smith, Secretary; Gilbert Wyley, Chairman; F. G. Staples.

We have had very little sickness of any character and no cases of infectious diseases. Several nuisances were reported, all of which were removed. Our system of sewerage has been extended.

Oldtown.

Members of the board: Artemas Rigby, Secretary; C. P. Barker, Chairman; John Buffum.

The survey for the Holly Water Works has been made and many of the large pipes are now laid. Twelve nuisances were reported to the board, and twenty-four in all were removed. I cannot give the number of cases of infectious diseases that have occurred, because they are not reported by the physicians, with one exception. In my opinion Oldtown village and Great Works village cannot be put in a good sanitary condition without a system of sewerage.

Orient.

Members of the board: Wm. McAllister, Secretary; James Estabrook.

We have had one case of nuisance which has been removed, there has been one fatal case of typhoid fever.

Orland.

Members of the board: R. P. Harriman, Secretary; Dr. F. P. Perry, Chairman and Health Officer; Henry Partridge.

We have had one case of typhoid fever.

Orneville.

Members of the board: Llewellyn Sanborn, Secretary; M. R. Morgan, Chairman; Charles Hoxie.

We have had no cases of the infectious diseases.

Orono.

Members of the board: C. P. Crowell, Secretary; Dr. J. H. Knox, Chairman and Health Officer; U. R. Penny.

We have had eight complaints of nuisances, and in all cases abatement was secured. There have been four cases of diphtheria with two deaths, and seven cases of typhoid fever with two deaths.

Orrington.

Members of the board: Dr. G. B. Tibbetts, Secretary; A. M. Lufkin, Chairman; C. M. Rogers.

We have had two cases of scarlet fever with no deaths, and six cases of typhoid fever causing three deaths. One school was closed on account of whooping-cough.

Four of the typhoid fever patients had been drinking water from the Penobscot river, obtained near and below Bangor where this disease has been unusually prevalent. I think the e is a close connection between the water and the disease in these cases.

Otis.

Members of the board: J. R. Grant, Secretary. We have had no cases of the infectious diseases.

Otisfield.

Members of the board: F. J. Sawyer, Secretary; D. L. Brett, Chairman; Sumner Spurr.

We have had six cases of typhoid fever, causing one death. Three of the cases of typhoid fever appeared to be caused by polluted well water.

Oxford.

Members of the board: S. P. Stuart, Secretary; Dr. Orin Stevens, Chairman; Geo. A. Poor.

Twelve nuisances were reported, eleven of which were removed. We have had one case of scarlet fever and two of typhoid fever, but with no deaths from either disease.

Palmyra.

Members of the board: C. M. Jewett, Secretary; Geo. W. Hanson, Chairman; N. B. Douglass.

One nuisance was abated. We have had one case of scarlet fever, and eight of typhoid fever, with two deaths from the latter disease. One case of glanders occurred in a horse.

The case of scarlet fever occurred in a girl of seven attending school. The school was closed, the house placarded and circulars were distributed, and although there were three other children in the same house no one else had it.

Parkman.

Members of the board: Dr. J. C. Butterfield, Secretary and Health Officer; H. O. Ayer, Chairman; Ireson Briggs.

We have had six cases of diphtheria none of which were fatal.

Patten.

Members of the board: Dr. F. F. Bigelow, Secretary; Leroy Miles, Chairman; Dr. B. C. Woodbury.

We have had three cases of diphtheria, and two of typhoid fever, with one death from the latter disease. Measles and whooping-cough have also prevailed.

Pembroke.

Members of the board: Wm. E. Leighton, Secretary; Dr. J. C. Rogers, Chairman; C. W. Hersey.

We have had eleven cases of diphtheria causing five deaths. All of the cases of diphtheria excepting one were clearly traceable to contagion, and came to us from outside of the town. One case we are unable to account for.

We are satisfied that we have had several cases of diphtheria in the past year which were never reported to the board, and that some cases which were reported, and from which death occurred, came from these sources, but as no physician was employed, there seemed no way to reach them until the mischief had been done. The good citizens who have given us their hearty co-operation are very, very largely in the majority. To them we tender our thanks.

Penobscot.

Members of the board: Dr. E. A. Sprague, Secretary and Health Officer; John Littlefield, Chairman; J. B. Snowman.

One nuisance has been reported and abated, we have had five non-fatal cases of typhoid fever. One death has occurred from drowning.

Perkins.

Members of the board: G. W. Call, Secretary; E. A. Hinckly, Chairman; T. G. White.

Three families have had water carried into their houses through iron pipes. We have had no cases of infectious diseases.

Perry.

Members of the board: G. P. Ricker, Secretary; J. B. Nutt, Chairman; Mark Leighton.

We have six cases of typhoid fever with one death.

Peru.

Members of the board: A. B. Walker, Secretary; Otis Wyman, Chairman; A. E. Eastman.

We have had no cases of the infectious diseases.

Phillips.

Members of the board: M. H. Davenport, Secretary; Dr. C. L. Toothaker, Chairman; E. M. Robinson.

Four nuisances have been removed. Typhoid fever, probably a mild type, occurred, and mumps and measles have been prevalent.

Phippsburg.

Members of the board: Geo. Duley, Secretary; F. S. Bowker, Chairman; Dr. M. H. Ferguson.

We have had two non-fatal cases of typhoid fever.

Pittsfield.

Members of the board: Dr. T. M. Griffin, Secretary; H. C. Pooler, Chairman; D. M. Parks.

Some extension of the sewers has been made. Six nuisances were reported, five of which were removed. We have five cases of diphtheria with one death, and six of typhoid fever with two deaths.

Pittston.

Members of the board: J. E. Jewett, Secretary; E. A. Lapham, Chairman; Dr. C. C. Libby.

We have had two cases of diphtheria ending in recovery.

Plymouth.

Members of the board: Dr. J. L. Curtis, Secretary; J. F. Longley, Chairman; S. P. Gifford.

We have had no cases of contagious disease.

Poland.

Members of the board: Dr. Walter Corliss, Secretary; S. L. Littlefield, Chairman; B. M. Fernald.

Four nuisances were removed. We have had five cases of typhoid fever. Measles was prevalent.

PORTER.

Members of the board: Warren Libby, Secretary; D. Ridlon, Chairman; Amos Blazo.

Two nuisances have been removed. One fatal case of typhoid fever occurred. One case of accidental shooting occurred, and one of drowning.

PORTLAND.

Members of the board: Geo. C. Burgess, Secretary; Dr. Chas. D. Smith, Chairman; Dr. A. K. P. Meserve; John H. Sayward, Inspector.

The water supply is from Lake Sebago. The new reservoir of 20,000,000 gallons capacity is finished, and now in use to supply the low levels of the city. Sewers have been built in thirteen different localities, in length, 3,713.7 feet. These were very much needed, and have greatly improved the neighborhood where built. The method of removing excreta in air-tight casks has been continued. The material is composted outside of the city limits.

The number of formal complaints of nuisances made to the board has been 457. All have been removed or remedied as far as could be done.

We have had sixty-one cases of diphtheria with five deaths, twenty-five cases of scarlet fever with two deaths, and fifty-six cases of typhoid fever with ten deaths. When a notification is received of cases of the infectious diseases, the inspector visits the house with circulars and directions adapted to the case. If diphtheria or scarlet fever are reported, the premises are placarded, removable only on the order of the attending physician. The premises are examined and cleaned up if such action is necessary. Many of the cases of typhoid fever seem directly traceable to impure drinking water.

The report of the State Board of Health two years ago called the condition of the privy vaults at the North School "abominable." They have not been improved; in fact, are worse, and if any stronger word can be found I should use it in connection with the premises.

For the purpose of improving our sanitary condition, I would make the following suggestion: Continue to build sewers. Enact a plumbing law so that cheap work which leads to poisoning the air

of houses may be prevented. Compel landlords to provide decent sanitary conditions in premises from which they derive an income. Sickness or death has resulted from the following accidents or causes: Falls, 2; drowning, 10; railroad, 2; unknown, 1.

By continuing our house-to-house inspection we are stirring up our people to a better appreciation of proper sanitation. It is much easier to have matters attended to now than it was two years ago, and our fall inspection of yards and alley-ways showed that they were in a very creditable condition, "Eternal vigilance is the price of—cleanliness."

Pownal.

Members of the board: Dr. S. A. Vosmus, Secretary; I. S. Brown, Chairman; Moses Plummer.

We have had no cases of infectious diseases.

Prentiss.

Members of the board: J. F. Belden, Secretary; E. E. Butters.

Presque Isle.

Members of the board: Dr. Frank Kilburn, Secretary; Dr. G. H. Freeman, Chairman; C. P. Allen, Esq.

One nuisance was removed. We have had one case of diphtheria: eleven cases of scarlet fever (reported) with one death; and thirty nine cases of typhoid fever with two deaths. Nearly all the cases of typhoid fever occurred in the northern section of the village within a radius of two hundred yards. The drainage was there defective, and none of the patients had used the water from the reservoir.

Five cases of typhoid fever occurred in one family, a mile from the village where the well is situated in the barn-yard. In fact, nearly all the cases could be traced to filthy well or spring water.

For the purpose of improving the sanitary condition of the town, I should advise the extension of the sewerage system, the use of dry earth closets, and supplying furnaces with cold air boxes, instead of taking the air from the cellars, as is the almost universal custom in this section.

Princeton.

Members of the board: Dr. S. G. Spooner, Secretary; Dr. C. Flower, Chairman; James Spencer.

One nuisance was removed. We have had three cases of diphtheria imported and ten cases of typhoid fever. No deaths, however, resulted from either disease. One drowning accident occurred.

Prospect.

Members of the board: J. H. Littlefield, Secretary; Robert Killman, Chairman; G. A. Avery.

We have had three cases of typhoid fever, ending in recovery. I think the Sanitary Inspector should be increased in size and an effort made to increase its circulation.

Randolph.

Members of the board: B. A. Cox, Secretary; Albert White, Chairman; Benjamin Clark.

Six nuisances were removed. We have twelve cases of diphtheria with one death, and three of typhoid fever, all of which recovered.

In the only case of diphtheria which proved fatal, the parents of the child pretended to know more than the doctor and would not believe it was diphtheria or follow his advice. In one case of diphtheria, where the parents did family washing, the boy was removed to a front room, the case kept a secret, and for several days the washing and laundrying and returning of the clothes to their owners, continued. Happily, as the boy grew worse, the parents became alarmed and sent for the physician who at once notified our board.

We have freely circulated the circulars on diphtheria and other contagious diseases you have sent us, and hope that our people will soon be educated to the importance, not only of preventing contagious diseases, but of assisting the boards of health by keeping their premises in a better sanitary condition.

Rangeley.

Members of the board: S. A. Ross, Secretary; J. F. Herrick, Chairman; Daniel Howe.

Raymond.

Members of the board: Dr. L. H. Jordan, Secretary; L. Welch, Chairman, Alfred Wilson.

One nuisance was abated. We have had three cases of typhoid fever. One case of tuberculosis occurred in a cow.

READFIELD.

Members of the board: Dr. E. S. Hannaford, Secretary; Dr. W. A. Wright, Chairman; Prof. W. C. Strong.

One nuisance was removed. We have had one case of diphtheria, thirty-three cases of scarlet fever, and two of typhoid fever. Scarlet fever made its appearance at Kent's Hill last spring, and there has been an occasional case in different parts of the town to the present time. The case of diphtheria was inquired into thoroughly and no source or cause was found except that he was in the habit of drinking from a "spring," as he called it, located in a swamp, or low piece of ground which, at times, is about covered with water.

RIPLEY.

Members of the board: A. G. Farrar, Secretary; A. R. Dunlap, Chairman; W. H. Lambard.

Four nuisances were removed. We have had two cases of typhoid fever. Both recovered.

ROBBINSTON.

Members of the board: F. R. Leach, Secretary; Alonzo Smith, Chairman; E. N. Campbell.

We have had no cases of infectious disease.

ROME.

Members of the board: L. G. Martin, Secretary; J. E. Farnham, Chairman; Geo. S. Tibbetts.

We have had eight cases of diphtheria with two deaths.

In regard to the outbreak of diphtheria it is the old story repeated. A young man having been at work from home in another town came home with a mild form of sore throat, was not confined to the house, and nothing was thought of the matter. A few days later, a little girl in the family was taken sick, a physician was called and pronounced it a case of diphtheria, but failed to report it to the board of health. Soon other members of the family were taken sick, two of which died. The board of health became alarmed and a physician was called, who pronounced it diphtheria in a malignant form. The board then took the outbreak in hand, and it spread only to an adjoining neighbor's house who had been calling there before the nature of the disease was known.

Roxbury.

Members of the board: A. W. Robbins, Secretary; S. M. Locke, Chairman; John Reed.

We have had one case of diphtheria.

Rumford.

Members of the board: Dr. H. F. Abbott, Secretary; H. M. Colby, Chairman; Wilson Thomas.

Saco.

Members of the board: Dr. L. D. Dennett, Secretary and Health Officer; Dr. F. E. Maxcy, Chairman; Dr. W. T. Goodall.

Two new sewers have been built, one on Spring street and one known as the Woodbury brook sewer. Twenty-six nuisances have been reported, all of which have been removed.

We have had one case of diphtheria, eighteen of scarlet fever, and eight of typhoid fever, but no deaths have been reported from these causes. The cases of scarlet fever were very mild indeed.

Salem.

Members of the board: Geo. W. Harris, Secretary; A. H. Perry; N. P. Harris.

We have had no cases of infectious diseases.

There should be a board of inspectors of any and all kinds of spices, molasses, lard, sugar, tea, etc., and they should have power to prosecute for sales of adulterated articles, or for keeping them for sale within the State of Maine. Highway robbery means your money or your life; adulterated food means your money *and* your life. There is a law for one; there should be for both.

Sanford.

Members of the board: Geo. E. Allen, Secretary; A. B. Sanborn, Chairman; ——— ———; Dr. E. C. Frost, Health Officer.

Two nuisances have been removed. The local board of health ordered all cesspools and vaults cleaned out twice each year; in November, and between April 15th and May 15th.

We have had sixteen cases of diphtheria with four deaths, and eight of typhoid fever with one death. Diphtheria prevailed in the spring at Springvale; the rest of the season was very healthful.

Sangerville.

Members of the board: H. L. Leland, Secretary; A. T. Wade, Chairman; E. P. Files.

No cases of the infectious diseases are reported.

Scarboro'.

Members of the board: Dr. J. B. Thornton, Secretary; B. F. Carter, Chairman; M. I. Milliken.

Four nuisances have been removed. We have had three cases of diphtheria, twelve of scarlet fever, and two of typhoid fever, with one death from each disease.

Searsmont.

Members of the board: J. W. Farrar, Secretary; P. S. Wing, Chairman; Dr. A. Millett.

We have had no cases of the infectious diseases, excepting whooping-cough.

Searsport.

Members of the board: Dr. E. Hopkins, Secretary; W. O. Barney, Chairman; W. B. Sawyer.

The town has put in a good artesian well which furnishes an inexhaustible supply of good water. Three nuisances have been removed. We have had one mild case of typhoid fever. A good, thorough system of drainage is much needed.

Sebago.

Members of the board: B. F. Cole, Secretary; P. P. Larrabee, Chairman.

We have had one non-fatal case of typhoid fever.

Sedgwick.

Members of the board: M. L. Ellwell, Secretary; Dr. R. E. Hagerthy, Chairman aud Health Officer; J. W. Penney.

We have had six cases of typhoid fever, all in the same locality.

Shapleigh.

Members of the board: Dr. F. A. Bragdon, Secretary and Health Officer; John Pugsley, Chairman; Dr. L. W. Leighton.

We have had two cases of diphtheria, one of scarlet fever, and four of typhoid fever. One of the typhoid fever patients died.

SHERMAN.

Members of the board: L. C. Caldwell, Secretary; Dr. D. H. Owen, Chairman; G. W. Durgan.

We have had but one case of diphtheria and this was in a mild form. Immediate action was taken, the patient was isolated, food was cooked away from the premises and carried in free of cost to the family, and at the close of the sickness the clothing and premises were thoroughly cleaned and disinfected, and no other cases have followed.

The board visited nearly every family in town in the early summer and examined the premises. A marked improvement has followed our suggestions regarding drainage, greater care as to the water supply, and the removal of excreta and care of privies. Both in regard to private and public establishments, the people are more thoroughly interested in the matter, and heartily endorse any movement of the board in relation to better sanitary conditions.

SHIRLEY.

Members of the board: H. Blackstone, Secretary; A. T. Mitchell, Chairman; J. Dennen.

We have had no cases of the infectious diseases. Our board has had but very little to do but intends to do its duty whenever occasion requires.

SKOWHEGAN.

Members of the board: Geo. Cushing, Secretary; Dr. S. A. Patten, Chairman and Health Officer; S. A. Bickford.

We have been completing and perfecting the city water supply, and the sewerage system has been extended. Several nuisances have been reported and all of them have been removed that could be. There is much need of the completion of the sewerage system.

We have had four cases of diphtheria with one death, and twenty-two cases of typhoid fever, with four deaths. The excess in the typhoid fever prevalence appears to have been caused largely by the defective drainage.

SMITHFIELD.

Members of the board: W. J. Haines, Secretary; I. W. Varney, Chairman; C. N. Simmons.

We have had no cases of the infectious diseases.

SMYRNA.

Members of the board: A. J. Berry, Secretary; A. P. Daggett, Chairman; H. C. Douley.

SOLON.

Members of the board: Dr. S. F. Greene, Secretary and Health Officer; Stephen Merrill, Chairman; J. Whipple.

We have had no cases of the infectious diseases.

SOMERVILLE.

Members of the board: Morrill Glidden, Secretary; A. L. Soule, Chairman; J. E. Bartlett.

We had one fatal case of diphtheria. Placards were posted on the house, premises disinfected, and after the burial we had the house thoroughly cleansed.

SOUTHPORT.

Members of the board: W. T. Maddocks, Secretary; Albert McKeown, Chairman; Stephen Pierce.

We had sixteen cases of diphtheria with one death, but most of the cases were in very mild form. We have had a few cases of very mild scarlet rash. The cases of mild diphtheria were at first considered nothing but sore throat.

SOUTH THOMASTON.

Members of the board: F. J. Dow, Secretary; Isaac Tolman, Chairman; John Alexander.

We have had six cases of diphtheria with one death, and one case of typhoid fever.

ST. ALBANS.

Members of the board: Dr. C. A. Moulton, Secretary; N. H. Vining, Chairman; N. B. Turner.

We had two non-fatal cases of typhoid fever.

STANDISH.

Members of the board: D. L. Warren, Secretary; M. S. Spear, Chairman; C. D. W. Shaw.

One nuisance was abated. We have had one case of scarlet fever, and four cases of typhoid fever. Two of the typhoid cases

ended fatally. The four cases of typhoid fever were all in one family and one house, and we think the disease might have been caused by a cesspool under the sink-spout which was in an unsanitary condition. It was removed.

Starks.

Members of the board: Thomas Buswell, Secretary; J. F. Frederic, Chairman; L. F. Butler.

We have had one fatal case of diphtheria. As soon as the case of diphtheria was reported, the board went to the house and had the patient placed in a room away from the family, and gave strict orders to have no one go into the room except the necessary attendants. We posted a card on the door and forbade all intercourse with neighbors, except in cases of necessity. Although the family consists of seven persons no other one took the disease.

Stetson.

Members of the board: Dr. E. W. Perry, Secretary; Geo. M. Bond, Chairman; C. W. Wentworth.

We have had two non-fatal cases of typhoid fever.

Steuben.

Members of the board: J. C. Googins, Esq., Secretary; G. W. Moore, Chairman; M. S. Smith.

We have had three cases of typhoid fever, but no deaths from this cause. The attending physician thought one of the cases of typhoid fever had been caused by polluted water, and we caused the throwing of waste stuff where it would drain into the water supply, to be discontinued.

St. George.

Members of the board: Dr. A. Woodside, Secretary; H. F. Kalloch, Chairman; W. H. Matthews.

Two nuisances were removed. We had nine cases of typhoid fever, all recovering. Seven other cases were landed at this port from vessels. In my opinion, the cause was from the use of impure water.

Nearly every year cases of typhoid are brought home from sea These are usually among the worst cases that physicians are called to treat, for the patients are usually much exhausted by the travelling, and the food and other conditions on board

the vessels are not suitable for sick persons. It seems to me that the cause of this disease, in these cases is, usually, from polluted water. The captains of vessels are not particular enough about obtaining pure water, and if the water casks are once filled with impure water the pollution (or infection) is apt to remain, for the casks are usually, or frequently, refilled without any cleansing. If you could call the attention of these parties to this important subject, through the press or otherwise, you would do an important service, and perhaps save many lives.

Stockton.

Members of the board: Dr. G. A. Stevens, Secretary and Health Officer; J W. Thompson, Chairman; J. F. Hichborn.

One nuisance was removed. We have had three non-fatal cases of typhoid fever.

Stoneham.

Members of the board: W. L. Goodwin, Secretary; Hilton McAllister, Chairman; N. H. Palmer.

We had no cases of the infectious diseases.

Stow.

Members of the board: C. W. Day, Secretary; O. P. Charles, Chairman; O. R. Barrows.

One nuisance was removed. We had two cases of typhoid fever both recovering.

Strong.

Members of the board: J. W. Porter, Secretary; G. Z. Higgins, Chairmen; M. A. Will.

We have had one case of diphtheria, ending in recovery.

Sullivan.

Members of the board: Dr. F. W. Bridgham, Secretary and Health Officer; M. H. Hawkins, Chairman; M. E. Rideout.

Four nuisances have been removed. The drainage, as a general thing, is good, and the people generally are particular as to the disposal of excreta. Some wells in which the water was polluted have been filled, and some have been ordered to be cleaned out and cemented.

We have had nine cases of typhoid fever, all ending in recovery. The unusual prevalence of typhoid fever was attributed to the lowness of the water in the well.

In the quarry districts slops and excreta generally are thrown out of the windows directly upon the ground. In some instances the board has compelled the erection of privies and their proper management. Six, out of nine patients with typhoid fever, used water from this spring, into which had probably drained some of the soluble excreta from the quarries just above.

Two cases of arsenical poisoning occurred, one from the dust raised by ravelling green rags for rugs; one from holding bits of similar rags in the mouth.

SUMNER.

Members of the board: Sharon Robinson, Secretary; L. H. Bisbee, Chairman; Dr. C. H. Bisbee, Health Officer.

One nuisance was removed. We have had two cases of typhoid fever, both recovering. The removal of some hog-pens and privies too near residences and wells would improve the sanitary condition of some places.

SURRY.

Members of the board: Dr. W. E. Emery, Secretary and Health Officer; D. G. Means, Chairman; Augustus Milliken.

Two nuisances have been removed. We have had one case of diphtheria and twelve of typhoid fever, with one death from the latter disease.

SWANVILLE.

Members of the board: H. E. Greeley, Secretary; C. M. Marden, Chairman; Z. L. Downs.

No cases of the infectious diseases have been reported.

SWEDEN.

Members of the board: E. F. Bangs, Secretary; O. R. Maxwell, Chairman; Elden Brown.

We have had two mild cases of typhoid fever.

TALMADGE.

Members of the board: F. R. Neale, Secretary; H. F. Dinsmore, Chairman; George Williams.

There have been no cases of the infectious diseases.

Temple.

Members of the board: S. R. Norton, Secretary; L. H. Farmer, Chairman; G. W. Staples.

One nuisance was removed. We have had no cases of infectious disease, excepting one of typhoid fever.

Thomaston.

Members of the board: Dr. H. C. Levensaler, Secretary and Health Officer; J. H. H. Hewitt, Chairman; Dr. J. E. Walker.

A few cases of nuisance reported to the board were promptly abated. We had one case of diphtheria and fifteen of typhoid fever. One of the typhoid cases ended fatally. The cases of typhoid fever were apparently caused by the defective drainage, and we need a system of sewerage.

Topsfield.

Members of the board: C. T. Day, Secretary; W. H. Malkson, Chairman; L. Tupper.

Topsham.

Members of the board: J. C. Purington, Secretary; Dr. I. S. Curtis, Chairman and Health Officer; David Work.

Three nuisances have been reported of which two have been removed. We had one case of diphtheria and two fatal cases of typhoid fever.

Tremont.

Members of the board: Dr. W. A. Spear, Secretary; J. T. Clark, Chairman; J. H. Gilley.

Four nuisances have been reported to the board, of which three have been removed. We have had eight cases of typhoid fever with two deaths. There was an unusual prevalence of typhoid fever from contagion, that was not recognized at first, until it was well developed and pretty generally spread.

Trenton.

Members of the board: K. K. Thompson, Secretary; W. G. Bunker, Chairman; D. B. Alley.

We had two cases of typhoid fever, one of which was fatal.

Trescott.

Members of the board: John Saunders, Secretary; W. H. Leighton, Chairman; S. A. Wilcox.

We have had three cases of diphtheria, one of which was fatal. In the case of diphtheria, the family having the disease, and others living in the vicinity, were at once supplied with the necessary directions issued by your board, the house was placarded and was afterwards thoroughly fumigated. Whooping-cough has been prevalent.

Troy.

Members of the board: Dr. M. T. Dodge, Secretary; O. B. Rhoades, Chairman; John Woods.

Turner.

Members of the board: Seth D. Andrews, Secretary; H. C. Haskell, Chairman; J. H. Conant.

Five nuisances were reported and all were removed. We have had one case of diphtheria, and nine cases of typhoid fever, of which one was fatal. In the diphtheria case the secretary immediately visited the family, placarded the house, stopped the other children from going to school, visited the teacher and distributed circulars to the neighbors. Two of the cases of typhoid fever were caused by impure water, so the physician reported.

There are seventeen school-houses in town. The members of the board have visited them all. Many of them were in a bad condition, and arrangements were made for improvements.

Two cattle were slaughtered by the State Veterinarian on account of tuberculosis.

Union.

Members of the board: Dr. A. P. Heald, Secretary; E. Daniels, Chairman; A. J. Young.

Two nuisances were reported. We had five cases of typhoid fever, of which two were fatal. During the months of April and May, we had an epidemic of measles. No disease of animals prevailed except pinkeye which appears to effect horses and persons somewhat alike, though I fail to see that it necessarily affects horses and people at the same time.

In the adjoining town of Appleton, I treated a man sick with typhoid fever in the month of August. The house was quite small in comparison with the number of inmates. He recovered, but his wife succumbed to the malady four or five weeks later, and this is the only instance where I have seen two persons in one family suffer from this same disease, and I account for this, as also for the result in this particular case, by her having almost exclusively cared for her husband night and day, as nurses were not to be had, and the neighbors were busy.

UNITY.

Members of the board: Dr. James Craig, Secretary; John Perley, Chairman; Benjamin F. Kelley.

We have had no cases of the infectious diseases.

For the past fourteen years this town has not had an epidemic, except scarlet fever in a mild form thirteen years ago. Have had one case of diphtheria in the village during that time. One case of typhoid fever developed in Massachusetts and came here, but no new cases from that.

The school-houses in this town are in a horrible condition.

UPTON.

Members of the board: Enoch Abbott, Secretary; W. F. Hemingway, Chairman; F. B. Brooks.

We have had two cases of scarlet fever.

VANCEBORO'.

Members of the board: C. A. Sterling, Secretary; W. R. Finson, Chairman; George H. Peva; Dr. M. L. Young, Health Officer.

Fourteen nuisances were removed. We have had no cases of the infectious diseases, except one non-fatal case of scarlet fever.

Improved drainage is needed in the village, one death occurred from drowning. One herd of hogs was nearly destroyed by hog cholera.

VASSALBORO'.

Members of the board: Dr. G. L. Randall, Secretary; Dr. F. A. Libby, Chairman; C. A. Stilson.

We have had four cases of diphtheria with one death. Two cases of scarlet fever ending in recovery.

VEAZIE.

Members of the board: L. H. Parke, Secretary; O. D. Winchester, Chairman; J. B. Skinner.

Four nuisances were cheerfully removed by their owners. The town is always ready to help the health officers in the discharge of of their duties. We had four cases of typhoid fever.

VERONA.

Members of the board: A. H. Whitmore; Secretary; Joseph Allen, Cha rman; Peter Abbott.

We have had six cases of diphtheria, none of which were fatal. Our first case of diphtheria occurred in a child who became sick on board a coasting vessel, and who was landed at the house of her grandmother. The board of health took charge of the case, the patient recovered, and no more cases occurred. In a few days another grandchild, sick with the same disease, died in Hampden, and the old lady went to the funeral and kissed the corpse. She came home and was taken down with diphtheria and had a hard time, but recovered. She is sixty-five years of age. We consider our town fortunate that, in the three different times within the year that we have been exposed, the spread of the disease has been prevented. I believe it due in a great measure, to the prompt action of the board of health.

VIENNA.

Members of the board: L. C. Davis, Secretary; LaForest Dowst, Chairman; Horatio Porter.

We have had one case of typhoid fever that recovered. Cases of the infectious diseases were attended to immediately.

VINALHAVEN.

Members of the board: Dr. F. A. Smith, Secretary; William H. Littlefield, Chairman; J. A. Babbage.

Thirteen nuisances were reported of which twelve were removed. We had four cases of diphtheria with one death, one case of scarlet fever, and six of typhoid fever in a very mild form. Better sewerage is needed, the soil is shallow and it is impossible to sink a sewer below the frost.

WAITE.

Members of the board: C. B. Tupper, Secretary; J. B. Phelps, Chairman; J. C. Neals.

WALDO.

Members of the board: George C. Harding, Secretary; A. J. Simmons, Chairman; J. D. Webster.

We had one non-fatal case of scarlet fever.

WALDOBORO.'

Members of the board: Dr. F. M. Eveleth, Secretary; C. E. Hovey, Chairman; Everett Farrington.

We had one non-fatal case of scarlet fever, and one fatal case of typhoid fever.

WALES.

Members of the board: Benj. Hodsdon, Secretary; A. M. Donnell, Chairman; T. T. Jenkins.

We have had no cases of the infectious diseases. Pneumonia prevailed more than usual, and in the east part of the town, during the summer there was throat disease of mild form that prevailed to some extent.

WALTHAM.

Members of the board: Alden K. Haslam, Secretary; J. H. Haslam, Chairman: Wm. Fox.

No cases of infectious diseases are reported by the board.

WARREN.

Members of the board: Dr. J. M. Wakefield, Secretary and Health Officer; W. O. Counce, Chairman; B. B. Libby.

We had three cases of diphtheria with one death, and four cases of typhoid fever, one of which proved fatal. As to the wants of the town from a sanitary point of view, it is the old story, pure water and better drainage.

WASHBURN.

Members of the board: Dr. P. J. Conroy, Secretary and Health Officer; C. L. Stoddard, Chairman; E. M. Hinds.

Five nuisances have been removed. We have had fifteen cases of typhoid fever none of which were fatal. Better drinking-water is needed in some parts of the town.

Washington.

Members of the board: T. S. Bowden, Secretary; J. F. Davis, Chairman; E. A. Sivlinger.

Two nuisances were removed. We had six cases of typhoid fever with two deaths. Better ventilation of public halls, school-houses, and private residences is needed. The local board of health has caused the several school-house privies, many of which were nuisances, to be thoroughly cleansed.

Waterboro'.

Members of the board: L. E. Langley, Secretary; J. T. G. Emery; Geo. P. Chase.

Waterford.

Members of the board: Dr. C. L. Wilson, Secretary; Melville Monroe, Chairman; C. M. Cooledge.

We have had no cases of the infectious diseases.

Waterville.

Members of the board: H. D. Bates, Secretary; Dr. M. H. Holmes, Chairman; Geo. A. Alden.

Wayne.

Members of the board: Dr. F. L. Chenery, Secretary; Dr. C. H. Barker, Jr., Chairman; W. Jennings.

Webster.

Members of the board: J. G. Jordan, Secretary; A. J. Larrabee, Chairman; T. C. Billings.

Two nuisances were removed. We do not know that there have been any cases of the infectious diseases in town.

Weld.

Members of the board: Dr. C. E. Proctor, Secretary and Health Officer; A. E. Houghton, Chairman; L. L. Jones.

One nuisance was removed. We have had two cases of typhoid fever, one fatal. Pneumonia and cerebro-spinal meningitis have been unusually prevalent. Pneumonia prevailed especially along the cold, flat localities.

Wellington.

Members of the board: Reuben Whitehouse, Secretary; A. C. Curtis, Chairman; Joseph Libbey.

We have had no cases of the infectious diseases.

Wesley.

Members of the board: H. F. Day, Secretary; J. Driscoll, Chairman; J. W. Day.

We had one case of diphtheria and perhaps more, not fully developed. Rheumatic troubles were so prevalent that they almost seemed to be contagious and epidemic. Whooping-cough was also prevalent.

Westbrook.

Members of the board: H. K. Griggs, Secretary; Dr. A. H. Burroughs, Chairman; H. T. Clark.

Our water supply is from Sebago lake. Eighteen nuisances have been reported, twelve of which have been removed. Our town villages have been built up so rapidly that the building of public sewers has not kept pace with the wants of the people. We have had five cases of diphtheria, nine of scarlet fever, and twenty-nine of typhoid fever.

All through this section there was a disease among cows resembling cow-pox which terminated in the closing of the teats, and the consequent loss of the animal. I lost one myself.

West Gardiner.

Members of the board: S. M. Pinkham, Secretary; D. E. Merrill, Chairman; W. P. Haskell.

We have not known of any cases of infectious diseases.

Weston.

Members of the board: G. W. Brannen, Secretary; George Moody; Frank Gilpatrick.

We had two cases of typhoid fever, one of which proved fatal.

WESTPORT.

Members of the board: S. P. Webber, Secretary; Jas. Thomas, Chairman; W. M. Pierce.

We had one fatal case of typhoid fever.

WHITEFIELD.

Members of the board: Dr. W. Johnson, Secretary and Health Officer; C. J. Skehan, Chairman; E. C. Jewett.

We had thirteen cases of diphtheria with three deaths. The cause of the cases of diphtheria was contagion.

WHITING.

Members of the board: W. J. Crane, Secretary; A. N. Crane, Chairman; Judson Hall.

We have had one case of diphtheria, but no deaths from this disease.

WHITNEYVILLE.

Members of the board: Jas. Pope, Secretary; D. W. Rollins, Jr., Chairman; W. M. Flynn.

We have had four cases of scarlet fever and one of typhoid fever, but no deaths from these diseases.

WILLIAMSBURG.

Members of the board: R. J. Williams, Secretary; J. R. Faulkes, Chairman; J. R. Hughes.

We had two cases of diphtheria, but no deaths resulted.

WILLIMANTIC.

Members of the board: Frank Hart, Secretary; W. A. Mills, Chairman; Irving Floyd.

One nuisance has been removed. We have had no cases of the infectious diseases.

WILTON.

Members of the board: Dr. A. B. Adams, Secretary; Joel T. Wilkins, Chairman; Frank F. Noyes.

Four nuisances have been reported, three of which have been removed. We have had three cases of typhoid fever. For the

improvement of the town, from a sanitary point of view, the water-closets and privies should be moved from over the stream and canal.

Windham.

Members of the board: Dr. I. D. Harper, Secretary; Dr. C. W. Bailey, Chairman; Dr. A. N. Witham.

Four nuisances have been removed. We have had four cases of diphtheria and four of typhoid fever, with one death from the latter disease. Two cases of measles occurred and one school was closed for one week.

Winslow.

Members of the board: G. S. Paine, Secretary; J. W. Bassett, Chairman; B. F. Towne.

We have had two cases of diphtheria with one death, and one case of scarlet fever. We have sought to confine the cases of infectious diseases to the house where they originate.

Winthrop.

Members of the board: Dr. C. A. Cochrane, Secretary and Health Officer; C. A. Wing, Chairman; G. A. Smith.

Several minor nuisances have been reported all of which have been removed. We had two cases of diphtheria and six of scarlet fever, but with no deaths from either cause. Our policy has been action at once, isolation, guards stationed to maintain the quarantine if necessary. Better drainage is needed in some parts of the village.

Wiscasset.

Members of the board: Dr. C. A. Peaslee, Secretary and Health Officer; Llewellyn Nute, Chairman; W. F. Merrill.

We had one case of scarlet fever and two of typhoid fever, with one death from the latter disease. The sanitary condition of the town could be improved by the removal of accumulative privies and filthy sink drainage.

Woodland.

Members of the board: D. A. Snowman, Secretary; A. W. Stover, Chairman; Andrew Johnson.

We have had no cases of the infectious diseases, excepting an epidemic of measles resulting in one death from consecutive pneumonia.

Woodstock.

Members of the board: Dr. C. B. Rankin, Secretary; A. P. Bowker, Chairman; I. W. Andrews.

One nuisance was removed. We have had three cases of diphtheria, four of scarlet fever and three of typhoid fever, but with no deaths resulting. The cases of scarlet fever in a mild form, occurred in a family of eight children. Four of them had it, and the other four have escaped thus far. The disease also appeared in a family in Milton Plantation about a mile from the above-mentioned family. It was said there had been no communication between the two families, but there is some doubt about that. We think that the poison was communicated from the first family before the nature of the disease was known.

Woolwich.

Members of the board: H. O. Thayer, Secretary; Howard Corliss, Chairman; Dr. S. P. Buck.

Yarmouth.

Members of the board: R. Harding, Secretary; Dr. W. W. Thomas, Chairman; C. T. Grant.

Four nuisances have been removed. We had one case of typhoid fever, ending in recovery. A water supply is needed in the village.

York.

Members of the board: Dr. W. L. Hawkes, Secretary; G. W. S. Putnam, Chairman; F. H. Ellis.

Healthy Homes for the Working Classes.*

BY VICTOR C. VAUGHAN, M. D., PH. D.

LOCATION.

The location of the home of the working-man is often determined by considerations over which he has no control. Cost of land and distance from place of labor must influence the selection. If possible, however, the house should not be located in a low, damp place, nor on made earth. In cities, many low tracts, and even the beds of small streams, marshes and lakes, are filled in with general refuse, such as street sweepings, back-yard rubbish, ashes and garbage. Such soil, unless thoroughly under-drained, must be unfit for the location of habitations. It is damp, and will for years be filled with the products of decomposition arising from the putrefaction of the garbage deposited there. Houses built in such locations must be damp, musty and unhealthful. The inmates of a house built in such a place are likely to suffer from malaria, bilious fever, and rheumatism, even if they do not fall victims to the more dreaded diseases, typhoid fever and consumption. The house should also be far from marshes and other low lands, whose surface is covered with water in the spring and early summer, and then exposed later. Such situations are likely to be malarious. Neither should the home be located near manufacturing establishments which usually have much garbage about them, such as breweries, tanneries, glucose factories, rendering houses, and oil refineries.

The site should be one which is naturally well drained; and whether this be the case or not often cannot be decided in cities without consulting maps which show the original lay of the land before any grading had been resorted to, though the position and

* This is the first part of "Healthy Homes and Foods for the Working Classes", one of the Lomb Prize Essays, published by the American Public Health Association.

course of neighboring streams and the location of springs may suggest valuable information. The slope of the land should be from the house. Extra precaution must be taken when it becomes necessary to build at the foot of a hill which is covered with houses from which the surface water and under-ground drainage flow toward the home. The location of neighbors' out-houses, with reference to the proposed home, should also be taken into consideration. While an intelligent man will not neglect the sanitary condition of his own premises, his neighbor's cesspool or privy vault may drain into his well and poison his drinking-water. Have the house upon a place high enough, and as dry as possible. Avoid, whenever practicable, narrow streets, which are devoid of sufficient sunlight and pure air. The width of the street should be twice the height of the houses along it, and no street, even in the business centres of cities, should be narrower than the height of the houses. In many of the older cities, however, the streets are narrower than this.

The best soils upon which to build are gravel, marl and limestone; for in these the drainage is likely to be better than in others.

A due amount of shade around the home renders it more healthy, but the shade should not be dense enough or close enough to the house to obstruct the air and light.

THE CELLAR.

Every dwelling-house, even that which has but one room in it, should either have a cellar, or should be raised sufficiently high from the ground to allow a free supply of air under it. The walls of the cellar should be perfectly water and air tight. It is better, in making the excavation, to remove the earth a foot, on all sides, further than the line on which the outside of the wall will stand; then, after the walls have been built, pack the space with clay or gravel. In this way the walls of the cellar are more likely to be kept dry. If built of brick the walls should be hollow, consisting of a thin outer wall two or three inches from the main wall. The two are firmly held together by occasionally placing a brick across from one to the other as the walls are being built. Unless this is done, moisture will pass through a brick wall, it matters not how thick it may be.

The cellar floor should be of concrete, about six inches thick, and covered with Portland cement or asphalt. If the soil be very damp,

tiling should be placed under the cellar floor, and carried out beneath the wall to a larger tile which passes around the house and leads off into some suitable receptacle.

It is absolutely essential to a healthy house, that its cellar should be free from dampness and ground air. In order to secure these requisites, the walls and floor of the cellar must be well built, even if it becomes necessary, on account of increased cost, to deprive the superstructure of some of its ornamentation

The cellar should be well supplied with light by having windows above ground, or by sunken areas in front of the windows. The window-sashes should be hung on hinges, so that they may be easily opened when the cellar needs an airing.

If the cellar is to be used for several purposes, as the location of the heating apparatus and the storage of fuel and vegetables, it should be divided into compartments, the temperature of which may be kept at different degrees.

Basement bed-rooms are almost universally unhealthy, and should be used only in cases of absolute necessity. It is also best not to have the kitchen in the basement, especially if the room directly above be occupied. If stationary wash-tubs be placed in the basement, they should have a metallic or porcelain lining, and the pipes which conduct the refuse water from them should be thoroughly trapped.

THE WALLS.

If built of brick the walls of the house should be hollow, as described in referring to the walls of the cellar. Furthermore, the plastering should never be placed directly on the brick. The inside of the wall should be "furred," scantling nailed to the furring, and the lathing done as in a frame house. It has been found that a single brick will absorb as much as one pound of water; and if a brick wall be built solid and the plastering placed directly on the brick, the house will be constantly damp. Many of the older brick houses are constructed in this manner, and consequently their interiors always have a damp, musty oder, it matters not how untiring the housekeeper may be in her efforts to have everything sweet and clean.

Even in case of a stone wall, the plastering should not be placed directly on the wall; though stone does not absorb water to any such extent as brick does.

New brick and stone walls are necessarily damp, and for this reason houses built of either should not be occupied until some weeks after the building of the walls. In order for them to dry thoroughly they must be pervious to air; and walls built as recommended above will allow the air to pass through them freely. Plastering does not prevent the air from passing through the walls, but papering does. However, as papering is the most economical way in which walls can be decorated, it will long continue in use. Wall papers containing arsenical colors have been, and are still to some extent, used. Rooms decorated with such papers are not suitable for living apartments. It is generally supposed that only the green colors contain arsenic, but, in truth, it may be present in paper of any color. The only way, then, by which they may be avoided is by having the selected samples tested. Any intelligent druggist or chemist will make the analysis for a small fee, which should be at the expense of the paper-dealer.

A nice way of finishing inside walls is to paint and then varnish them. The varnish prevents the rubbing off of the paint, and places the walls in such a condition that they may be washed whenever desirable.

THE FLOORS.

Floors should be made tight, so that they may be thoroughly scrubbed with soap and water occasionally. The best floor, from a sanitary view, is one of hard wood, planed smooth and oiled. It is far better to have a clean, bare floor, than one covered with a filthy carpet. However, where carpets are kept clean, and are occasionally taken up and the floor scrubbed, there is no objection to their use; and it must be admitted that a clean carpet adds much to the comfort of a room. A cheap straw matting is now made, which can be washed when necessary, and it will not retain dust and filth to the extent that woolen carpets do. Such a covering is especially suitable for dining-rooms.

ARRANGEMENT OF ROOMS.

The living-rooms should be on the sunny, airy side of the house. Human beings as well as plants demand sunlight. Too frequently the good housewife shuts out the sunlight for fear that it will fade the carpet. As some one has said, "It is far better to have faded carpets than to have faded cheeks." A little saving in the color of

the carpet is poor economy when it is secured at the cost of health. Especially should the room occupied by the women and children, who are indoors much of the time, be well supplied with light. If there is to be a long, dark hall or passage-way in the house, let it be on the side upon which the least sunlight falls, and place the living rooms on the other side.

It is, unfortunately, the fashion to make bed-rooms small in order to have a large sitting-room. Too often the bed-room is a mere recess scantily supplied with fresh air. It is better to have a smaller sitting-room and a larger bed-room. Even farmers often suffer from diseases which are due to an insufficient supply of pure air. This arises from the fact that for six or seven hours out of every twenty-four they are shut up in small, tight, musty bed-rooms, and are compelled to rebreathe the air which they have already once breathed.

As has been said in discussing the cellar, basement bed-rooms are always poorly supplied with fresh air, and are generally damp and musty. They should be used only in cases of absolute necessity. Attic bed-rooms are cold in winter and hot in summer, and their use also can be excused only on the question of dire necessity.

If the owner of the house can afford it, at least one bed-room should contain a grate or fire-place,—for, with every attention to the laws of health, there will come times when some member of the family will be sick; and the sick room should be full of cheer. The open fire is cheerful, and serves as an excellent ventilator. Pleasant surroundings often aid the doctor's pills and potions in restoring the patient to health.

Of course the number and exact arrangement of the rooms will depend upon the purse of the owner; but a cottage may be built so as to be as healthy as a palace,—and indeed the advantage is often in favor of the former, as the more complicated finishings and elaborate furnishing of the latter may serve as harbors for dust and filth.

Space may often be saved by doing away with the conventional long, dark hall, and by having the stairs go up from a sitting-room, or from a smaller vestibule. The long halls are often cold, dark and dreary. In winter they are filled with cold draughts, and in summer they are receptacles of refuse of various kinds, and at all times they are cheerless. They may be necessary in certain houses, but in small homes they are neither ornamental nor pleasant.

It is the ambition of most American housewives to have a parlor, in which the most valuable household ornaments are placed, and which opens only when some honored guest comes. The small boys of the family look upon it as forbidden territory, and too frequently both fresh air and sunlight are regarded as intruders, and are shut out. The exclusion of the small boy may be all right, but the air and sunlight should not be treated with so much discourtesy. Indeed, they should be consided the most honored guest, and should be welcomed even to a place in the parlor.

Probably the most important room in the house is the kitchen. Before you praise the housekeeping of any woman, visit her kitchen. The parlor may be a beauty, the bed linen may be spotless, the table may be covered with decorated china, but if the kitchen be filthy, all is in vain. But in order that the kitchen may be kept in good condition, its construction must be proper. The floor is best of hard wood or yellow pine; or, if these are too expensive, of selected white pine. They should be kept bare.

At least two windows, one on each side, are desirable. A pantry or shelves for setting aside clean cooking utensils and dishes should be at hand. If the cellar be used for the storage of vegetables, an inside stairway from the kitchen or pantry should lead down into it. The flour-box in the pantry should be so hung that it will close itself. It adds much to the comfort of the cook, and to the cleanliness of the walls and ceiling of the room, if the stove or range be covered by a hood which conducts the vapors arising from the cooking food into a flue in the chimney.

If the owner can possibly afford it, the house should contain a bath-room. In the absence of public water supply, a force-pump below, a cold-water tank in the attic, and a hot-water tank attached to the kitchen range will furnish the bath-tub. The room should be heated either directly or from another room, otherwise it would not be used much in cold weather. The cost of the bath-room and its supply need not be great, while the pleasure and benefit derived from its use will be appreciated.

THE WINDOWS.

The importance of an abundant supply of sunlight has already been insisted upon. If possible, every room should have direct light, and not be dependent upon that which is diffused through an adjoining room. The location of the windows should be such as to

give the greatest amount of direct sunlight. The windows should extend well towards the ceiling, and should be hung so as to lower from the top as well as raise from the bottom.

The window shutters or blinds must be hung in such a manner that they are easily opened. In no part of the house should they be kept closed during the day.

HEATING AND VENTILATION.

It would be wholly out of place to attempt here any elaborate discussion of the many methods of heating and ventilating buildings now in use. Only a few practical statements will be made with reference to securing adequate warmth and sufficient fresh air in dwellings.

The most common methods of heating small residences are by the stove, open fire, and hot-air furnaces. The stove is the most economical. The open fire is the most enjoyable, and where it is sufficient, the most healthy; but in the northern states the open fire alone seldom furnishes enough heat during the coldest months. The hot-air furnace may be so constructed as to be a good method, but care must be used in selecting the furnace and arranging for ventilation.

In small houses the heat is generally supplied by stoves. In rooms which are occupied only during a few hours of the day the wood stove is sufficient, and, indeed, has certain advantages. The room can be quickly heated, and when left, the fire soon dies out, thus saving fuel. But where the room is constantly occupied, coal is a more suitable fuel than wood. The temperature is more even, and the fire burns more slowly. The relative cost of these fuels varies in different sections.

The coal stove should have no loose joints through which gases can escape. The mica doors should be kept in repair, and the flue must not be allowed to clog. The principal gases given off from burning coal are carbonic acid gas, carbonic oxide, and sulphurous oxides. The carbonic oxide is poisonous when inhaled in any quantity. It produces a sensation in the head similar to that which would be caused by a tight band; and in larger amounts it renders persons insensible, and may produce death. It should be remembered that the carbonic oxide is without odor. Whole families have been fatally poisoned with it. Especial care must be taken with coal stoves which are used in bed-rooms or in rooms which commu-

nicate with bed-rooms, as the carbonic oxide may prove fatal to persons while sleeping, without waking them. But there is no danger if the stove and flue be in proper condition. Makers of wrought iron stoves and furnaces will insist that these gases pass readily through cast iron, and for this reason their stoves are superior, and free from danger; but a properly constructed and properly managed cast iron stove or furnace is free from danger, and in many respects is superior to those made of wrought iron. Especial attention should be paid to the position of dampers in coal stoves at night.

One of the greatest objections to the use of stoves is, that in houses in which they are used there is generally no attempt at ventilation. However, a house heated with stoves may be as well ventilated as any other. In houses as ordinarily built, much fresh air will come in through the crevices around the doors, windows, and baseboards. but if many occupy the room, the amount of fresh air which finds admittance through these channels may be insufficient: especially is this likely to be the case if the room is partly surrounded by other parts of the building, and consequently has but a small surface directly exposed to the out-door air. Besides, the direct draughts from doors and windows may be so great as seriously to affect the health of the inmates, giving them colds. When any any of these troubles exist, one of several simple devices may be resorted to in order to secure the admission of plenty of fresh air without dangerous draughts. The most common of these devises consists in fitting a piece of board from four to eight inches wide in the window frame under the lower sash. By this means a space is left between the bottom of the upper and the top of the lower sash, through which the air enters, and the current is thrown upward, striking the ceiling, from which it is diffused all over the room. Dr. Keen recommends tacking a piece of cloth across the lower eight or ten inches of the window frame, then raising the lower sash to a greater or less extent, according to the weather. In this way two air vents in the window are established, one under the lower sash, the current of which is turned upward by the cloth, and the other between the upper and lower sash, as when the board is used. Through the upper vent it is supposed that some of the foul air will escape, though the current through this opening is not invariably outward.

What is known as Maine's elbow-tube ventilator consists of a board placed under a raised sash, as already described. This board carries two tubes, about six inches in diameter, which turn upward, and the ends of which are supplied with valves by which the amount of in-flowing air can be regulated.

Another method provides for smaller tubes brought through the wall and turned upwards into the room. Some favor still another plan, which consists in bringing a tube about six inches in diameter through the wall, and, possibly, under the floor to the stove, where the tube terminates in a sheet-iron jacket placed around the stove, leaving a space of one or two inches, and having escapes only at the top of the jacket. The heat of the stove will produce a strong current through the pipe, and the incoming air will be warmed in passing through the jacket.

By any of the above-mentioned devices, abundant facility may be furnished for the admission of fresh air; but as two bodies cannot occupy the same space at the same time, there must be provided some escape for the foul air. This should always be attended to in the construction of the house. For every room which is to be heated by a stove, there should be two flues, one for the smoke and other gaseous productions of combustion, the other for the removal of foul air from the room. The ventilating flue must come to the floor, just above which should be a register. When there is a fire in the stove, the upper part of the ventilating flue will be warmed by the smoke flue, and consequently there will be an upward current in it. In this way the withdrawal of the foul air is rendered certain. It should also be seen, in the constrction of the chimney, that the inside of this ventilating flue is not left so rough as to impede the flow of air through it, and that it is not clogged with mortar or pieces of brick. A good draught through the ventilating flue is almost of as much importance as the draught of the smoke flue.

The partition between the smoke and ventilating flues should be of brick placed on edge, thus making it as thin as possible, so that the upper part of the ventilating flue will be thoroughly heated from the smoke flue. By another method the smoke flue may be made of iron pipe placed in a large flue, and the space all around the pipe will serve as the ventilating flue. I have stated that the register in the ventilating flue should be near the floor. If near the ceiling, as some would have it, there would be too great a loss of heat, as the

fresh air as soon as heated would find its exit. For summer ventilation, the foul air outlet may be at or near the ceiling; but such ventilation in winter costs too much, and, besides, when it is used, great difficulty will often be experienced in heating the room.

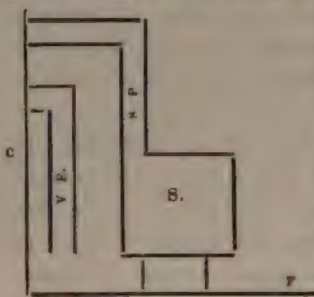


Fig. 1.—F., floor; S., stove; S. P., stove pipe; V. F., ventilating flue; C., chimney.

With the plan recommended above, there is no reason why any room heated with a stove may not be so well ventilated that no disagreeable odor will be perceptible to the most sensitive person upon coming in from the outdoor air; provided, always, that the room is clean. Unfortunately, however, the great majority of houses which are heated by stoves are built without the slightest provision for ventilation. In such houses, fresh air may be introduced according to the methods already given; but the escape of the foul air is more difficult to be provided for. It may be done, however, as follows: Place a tin or sheet iron pipe, of from six to ten inches in diameter, according to the size of the room, along the wall behind the stove. The lower end of this pipe extends to within a few inches of the floor, and remains open, while the upper end passes, by means of an elbow, into the smoke flue below the point at which the stove pipe enters, as shown in the accompanying Fig. 1. The upper end of the ventilating flue may, when the chimney begins near the ceiling, terminate in a jacket around the stove pipe, the jacket passing into the chimney, as here shown in Fig. 2. In all cases the ventilating flue is to have air-tight joints.

With the open fire or grate, the withdrawal of the foul air is all provided for, as it will escape up the chimney. The open fire is not so economical as the stove; but, when sufficient to warm the room, the former is, at least as both are ordinarily arranged, more healthful. With the open fire or grate, much of the heat escapes up the chimney; however, with the grate this loss of heat can be, to a considerable extent, lessened by setting the fire-basket well forward.

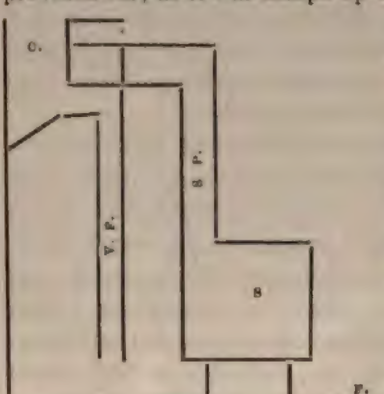


Fig. 2.

When the hot-air furnace is used, certain precautions are desirable, both for economy and health. In the first place, the

furnace selected is nearly always too small for the extent of heating required of it. When this is the case, the fire must be pushed as much as possible in order to keep the rooms warm in winter; consequently the air entering the room is over-heated, and produces headache and dulness. At the same time the furnace is soon burnt out and any money saved in the first place by purchasing the smaller size will have to be expended with an additional amount in securing a new furnace.

The furnace should be thoroughly encased with thick brick walls, to prevent great loss of heat by direct radiation in the cellar. The owner of the house will be rewarded for his time and trouble if he sees to it that this work is well done.

The furnace must receive the air which is to be heated directly from the out-door air, and not from the cellar. The cold-air duct should be perfectly air-tight, so as wholly to prevent the cellar air from entering the heating chamber. Wooden air-boxes are not to be recommended unless they be carefully lined with some metal. The external opening of the cold air-box should not be near any cesspool, drain, or other possible source of deleterious gases. It should also be protected by a piece of wire net. In the cold-air duct, preferably near its external opening, should be a sliding valve, by which the amount of air passing to the furnace can be regulated; but care must be taken that this valve is never entirely closed. Probably it would be better to have it made so that when pushed in as far as possible it will obstruct only half the area of the duct.

The air chamber in the furnace should be kept supplied with water. The hot-air flue should be so arranged that the horizontal ones are not more than fourteen or sixteen feet in length, for if the horizontal flues be much longer than this, the draught through them will be so slight that the rooms will not be warmed, while the rooms supplied with verticle pipes will be over-heated.

The warm-air register in the room should not be placed directly in the floor, but in the base-board. If placed in the floor, it soon receives a large amount of dust and other refuse.

With a hot-air furnace properly selected and arranged, the amount of warm, fresh air entering the room is sufficient. But before the fresh, warm air can enter, the air already present must find an exit. The following principles may guide us in economically ventilating a room heated with a hot air furnace:

(1) Bring the fresh air in near the floor.

(2) Take the foul air out near the floor.

(3) Create a draught in the foul air shaft by means of heat.

Unless the air already in the room has some means of exit, it will be found utterly impossible to heat the room with the warm air furnace. Then it will be seen that both the heating and ventilation depend largely upon the withdrawal of the foul air. If the foul air register be near the ceiling, much of the warm air from the furnace will escape directly into the foul air shaft. If there be an open fire in the room, the foul air will find a ready exit through the chimney. If there be only a ventilating flue, it should be in the same chimney with some other flue which is heated, at least in its upper half. Thus a number of ventilating flues from as many rooms may be placed in the same chimney with, and arranged about, the smoke flue of the furnace. Often we find that one ventilating flue is expected to do service for a room on the first floor, and also for another directly over it on the second. The result frequently is, that the foul air of the lower room passes into the room above. There should be a separate ventilating flue for each room.

WATER-SUPPLY.

It is of the greatest importance to the family that its supply of drinking-water be of unquestionable purity. That such dreaded diseases as cholera, typhoid fever, scarlet fever, diphtheria, and dysentery may be spread by impure drinking-water, there can now be no question.

The sources of drinking-water may be divided into the following classes:

(1) Cistern water.

(2) Surface water.

(3) Subterranean water.

Cistern water is that which is collected upon the roof of a house, and stored in a reservoir known as a cistern, or in a tank, which is usually placed in the attic of the house. Cisterns, or underground reservoirs, are more generally used than tanks.

The condition of this kind of water will be influenced by the air through which it falls, by the nature of the roof, and by the kind of cistern, and the care exercised in keeping the roof and cistern clean.

In large cities, especially where there is much manufacturing done, there is always a considerable amount of dust and other impurities in the air, much of which is brought down with the rains. The

conductors leading from the roof to the cistern should be supplied with means for turning off the first part of the rain-fall. In this way the impurities taken from the air and those collected on the roof are disposed of. Especially is this desirable if the roof be of wood and old, if there be a collection of leaves and other *debris* from projecting branches of trees, and if there be any chance of birds depositing their excrement upon the roof. Probably the cleanest roofing material is slate; but its cost has prevented its general use in the construction of residences.

The cistern should be built of brick, and plastered water tight upon the *outside* as well as upon the inside. Strict attention should be paid to this, and the walls should be so built as to prevent the possibility of water from the adjacent soil passing into the cistern.

The top of the cistern should be well covered, so as to prevent small animals as well as vegetable refuse from falling in. The best covering would be a box built up several feet above the ground, and covered with fine wire netting. In this way the fresh air will pass down, and the space above the surface of the water will be ventilated. When this cannot be used, a tight covering of stone, or of wood, if all boards are removed and replaced by new ones at the first sign of decay, may be used.

A wooden pump should not be placed in the cistern, as it soon decays, becomes covered with moss, and collects upon it much filth. An iron pipe with the pump in the kitchen is probably the best arrangement. However, the cistern should never be built under the house. When so built the air above the water is invariably bad, and the periodical cleaning out of the cistern, which should be done once a year at least, is not so likely to be attended to.

It is customary in some places to place near the top of the cistern an over-flow pipe which leads into a cesspool or privy-vault. This practice has, without doubt, cost many lives. There should not under any circumstances be any connection between the cistern and any receptacle of filth. This over-flow pipe is often untrapped, or the trap becomes defective, and the gases arising from the decomposing matter of the cesspool and privy-vault pass into the cistern. Indeed, cases are known where not only the gas, but fluid refuse, has thus been poured into the cistern.

However much care may be taken with the cistern,—and the above suggestions should be deemed of imperative importance,—the cistern water should be filtered before used. Many cheap and

effective household filters are made and it is not necessary to go into detail concerning their construction; but a few practical hints may be given as to their care. A filter which is kept constantly under water soon becomes utterly worthless. The charcoal box should be frequently exposed to air, and, if possible, to direct sunlight. A filter removes suspended matter, and, on account of the air condensed in the pores of the charcoal, destroys to a certain extent the organic matter held in solution in the water. If any epidemic disease prevail at the time, it is always safest to boil any and all water used for drinking purposes. Cistern water may be boiled and then filtered. If one has no regular filter, it will be better at all times to boil the water, after which it may be allowed to run through a piece of filter paper, which can be obtained for a trifle at any drug store, placed in a tin or glass funnel. When filter paper is used, a new piece should be placed in the funnel each day.

The purity of surface water will depend on the condition of the soil upon which it falls and over which it flows, as well as upon the air through which it falls. Water which falls upon and flows over a filthy soil should not be used for drinking. Since the amount of refuse on the surface of the earth is usually greater in thickly settled countries, the water collected on such sheds is unfit for use. That there is a certain degree of purification in running streams there can be no doubt; but notwithstanding this, specific poisons have been carried long distances in rivers, and have still manifested their poisonous effects.

When any serious epidemic prevails, and surface water constitutes the drinking supply, it should always be boiled. In India, the spread of cholera is often along the water-courses into which excrement from the sick and the bodies of the dead are often cast. Typhoid fever and dysentery are also often spread by the use of surface water.

The water collected in shallow wells is really surface water, and that often of the worse kind. The use of drinking-water from shallow wells is, as a rule, to be condemned. Many people think if water percolates through a few feet of soil, every harmful substance is removed. No greater mistake could possibly be made. Indeed, by percolation through the soil, the impurity of the water is often increased. Various kinds of filth which have accumulated upon and within the soil are dissolved in the water and carried into the well. Often we find in a small back yard a cesspool, privy-vault, and

well, all in close proximity. If the well be a shallow one, such an arrangement is probably the worst, in a sanitary sense, that could possibly be devised.

Subterranean waters used for drinking purposes are those obtained from springs and deep wells. Whether such waters are pure or not depends largely upon the geological formations in which they exist. The source of the water must be below rock or thick clay beds in order for the water to escape surface contaminations. Springs from gravel hills may be as impure as shallow wells. A very small amount of iron in water does not render it unfit for drinking; but water which contains more than one-tenth of one per cent of iron is unfit for constant use.

Deep wells should have their walls so protected as not to permit of surface water finding its way through them. If this is not the case, their waters may become quite as foul as those of shallow wells.

Subterranean waters are often hard. By this is meant that they fail to make a lather with soap, or a large amount of soap must be used with them in order to produce a lather. The hardness of water is due to the presence of certain inorganic salts, as those of lime and magnesia, which form insoluble compounds with soap. Hard waters are divided into two classes:

(1) Those whose hardness is removed by boiling. This is known as temporary hardness.

(2) Those whose hardness is not removed by boiling. This is known as permanent hardness.

Many waters possess both a temporary and permanent hardness. Such waters are improved by boiling, but are not rendered wholly soft.

Hard waters are not suitable for laundry purposes, especially when the hardness is largely permanent. They also often form incrustations in boilers. But unless the hardness be very great, it does not unfit the water for drinking purposes. There has been much discussion as to the possibility of hard waters producing goitre. It is well known that this disease is very prevalent in certain limestone districts; but that the use of hard water for drinking is the cause of the disease has not been positively demonstrated. It would be best, however, for families in which a tendency to goitre prevails to use soft water.

Hard water has also been supposed to favor the formation of gravel. The writer has met with a few persons who are troubled with gravel only when using hard water.

Some hard waters have an irritating effect upon the bowels of those not accustomed to their use, producing in such persons diarrhœas.

In case of the use of a public water-supply, it is the duty of the health authorities of the city to see that the water is wholesome, and it is the duty of the consumer to see that the water is not contaminated on his premises. Lead pipes and lead lined storage tanks should not be used for conveying or storing cistern water. The pipes should be of iron, or better still, of block tin, or should be lined with tin.

THE DISPOSAL OF WASTE.

One of the most important questions connected with modern sanitation is as to the best methods of disposing of waste matter. When allowed to accumulate in the vicinity of homes, it may poison both the water and the air. Many of the older cities of southern Europe have become thoroughly saturated with filth, and for this reason cholera has found a fertile field for its growth in Spain, Italy, and southern France. Filth and disease always go hand in hand, the former leading the latter. Cleanliness invariably lessens the death-rate. Typhoid fever, cholera, and other diseases, whose growth and spread are plainly due to the accumulation and putrefaction of waste matter, should be stamped out of existence. With perfect cleanliness they would not be known.

It is the writer's object to give here some practical suggestions for the disposal of waste matter. Probably the disposal of human excrement deserves more care than any other waste. In cities where there is an abundant public supply of water, and where sewers are in use, the water-closet is the most convenient method, and it may be made perfectly safe. Where water-closets are used, the so-called "separate system" of sewerage is desirable. This system provides two sets of sewer conductors. One of these is the ordinary brick sewer, and this system is used only for carrying off the storm water. The other is made of small sewer pipes which convey the sewage proper, and which are connected with flushing tanks, by means of which they are periodically flooded with water and washed clean. The advantage of this method is easily understood. When the sin-

gle system is used, the sewers are necessarily large, in order to carry off the great amount of rain-water. The bottom and sides of these sewers must be more or less rough, and they are flushed only at the time of heavy rain-falls; consequently much of the time the flow of sewage through them is slow, and the solid matter is deposited on the rough surfaces, where it decomposes with the formation of noxious gases, which escape through ventilators into the street, or pass through defective traps into the houses.

With the separate system the small sewer pipes with smooth inner surfaces are flushed three or four times a day, and their contents are swept out. It requires twenty-four hours at least for human excreta to decompose to such an extent as to evolve poisonous gases; therefore, if the pipes be flushed clean one or more times during the day, there can be but little danger from "sewer gas."

However, whichever system of sewerage is in use, the individual should take certain precautions in arranging his water-closets. In the first place, water-closets should not be placed in living-rooms or in bed-rooms. They should be located if possible in some detached part of the house. The kind of closet selected should be determined upon by some competent person. Changes and improvements in the patterns are being constantly made, so that should any preference be given at this time it might not hold good three months hence. The flushing tank for the water-closet should not in any way be connected with the drinking water-supply. The closet should be well trapped, and the trap should be so placed that it can be examined at any time without tearing up the floor or breaking into the wall. The habit which plumbers have of hiding all their work should be condemned. The soil pipe should not be connected at any point inside of the house, at least with the other waste pipes such as those from the bath-tub and stationary wash-bowls. The soil pipe should be ventilated by a pipe which should be as nearly perpendicular as possible, and which should extend above the roof of the house, and should not be placed near a window. This ventilation of the soil pipe is of the utmost importance, and should never be neglected.

When there is no system of sewerage, the dry-earth closet is the best method of disposing of human excrement. Indeed, upon sanitary grounds the dry-earth system is in many respects more desirable than the use of water-closets; but the former requires possibly more care than the latter. Economically, also, the dry-earth sys-

tem will prove the better when it comes into more general use, and the excrement is used as a fertilizer. A dry-earth closet properly kept is free from all noxious gases, and there is no possibility of the drinking water-supply becoming contaminated from it.

There are many patterns of dry-earth closets in use, but the simplest may be made as efficient as the most complicated and costly. A cheap form is made by placing under the seat boxes or drawers lined with galvanized iron. There is placed conveniently a quantity of dry earth, and for each evacuation a small shovel of the earth, from one to two pounds, is thrown in. When the drawers are full they are removed, emptied, and replaced. The best earth to use is pulverized clay mixed with about one-third its weight of loam. Ordinary garden soil may be used, if dried perfectly. Sifted coal ashes are almost or quite as good as any earth. Moreover, they are generally on hand, and to be disposed of in some way. The writer has used for his family a dry-earth closet for three years, and prefers the sifted coal ashes to any kind of earth. Gravel is not at all suitable.

With an ordinary family with not more than half a dozen members it is not necessary to empty the boxes more than once in three or four weeks. Their contents, which if enough soil or ashes has been added, is wholly inodorous, and may be emptied upon the garden. Here it is spaded in during the spring, and as a fertilizer amply repays for the time and trouble that has been taken with it. Several large cities in Europe have adopted the dry-earth system, and the waste is removed by those who desire to use it as a fertilizer.

The patent earth-closets are so arranged that the requisite amount of earth falls into the box in a manner similar to that by which the water-closet is flushed with water.

In case epidemics of any kind are prevailing in the neighborhood, it would be well to throw a handful of chloride of lime into the closet each day. And even when no epidemic prevails, but the weather is very hot, the same quantity of sulphate of iron (copperas) may be used daily. The cost of this substance is so small that it may be used freely when needed. Where many are using the closet, a vault may be dug beneath the seat, and made water-tight with brick and cement. Into this should be thrown each day a sufficient quantity of this dry earth, and the vault should be thoroughly cleaned at least once a month.

The ordinary privy-vault with porous walls is an abomination. It has caused more deaths in this country than war and famine have produced. The liquid poisons from it filter into wells, while its gaseous exhalations float through the air. People breathe and drink their own excretions, and typhoid fever and kindred diseases slay tens of thousands annually. It is safe to say that the privy-vault is the origin of the majority of the cases of typhoid fever. As the country becomes more thickly settled, the dangers from the privy-vault increase, and they should be wholly abandoned.

In many places it is the custom to move the privy, and cover the contents of the vault with a few shovels of dirt as soon as the vault is filled. In this way from one to half a dozen repositories of filth are formed in the average village back yard in a few years. Such a condition is certainly a highly unsanitary one.

The waste-pipes from the bath-tub and stationary wash-bowls should be well trapped, with the traps where they can be readily examined; and, as has been stated, these waste-pipes should have no connection, inside of the house at least, with the pipe from the water-closet. In the absence of sewage, the waste-pipes from the bath and bowls may be conducted into a cesspool. If the soil be gravelly, this cesspool should be lower than the bottom of the cistern, if the cistern be near. Its walls may be of stone or brick loosely laid, and a ventilating pipe should pass from the top of the cesspool and extend at least ten feet above the surface. No kitchen or laundry waste should be allowed to pass into this cesspool. Since the water passing into this cesspool comes only from the bath and wash-bowls, it does not contain a great deal of organic matter, and will pass into the soil. The cesspool for the kitchen slops should be walled up and made water-tight. This cesspool should also be ventilated by means of a large vertical pipe. The top of this cesspool should have a man-hole in its centre, covered with a stone or iron slab, which can be removed in order to clean out the cesspool.

It is better for all pipes leading to sewers or cesspools to be disconnected, or furnished with gully traps or with an air pipe just outside of the house, in order to prevent the possibility of gas passing from the sewer or cesspool into the house. All cesspools should be as far from the house as possible, and they should be cleaned at regular intervals. The contents of the kitchen cesspool may be used for fertilizing.

All solid kitchen waste should be removed daily by a scavenger, who does this without expense to the householder, or it may be dried under the kitchen stove in shallow pans and then burned in the kitchen fire, or, if in the country, it may be fed to hogs or other animals.

The dust swept from the floor should be burned, not thrown out into the yard. Ashes should be kept in a dry place, and if so kept they may often be disposed of without cost. The soap-maker will pay for dry wood ashes, and coal ashes are often sought for and used for filling in low places. Each fire-place and grate should be furnished with an ash-pit in which the winter's product may fall, and by which accident from fire is greatly lessened.

When a house is built, a plan of all its drainage pipes should be made and preserved, as with it a faulty pipe or joint may often be found with ease, when without it much work may be necessary in order to find where the trouble is.

THE SURROUNDINGS.

It would be better if residences were not built up in solid blocks. Even narrow passage-ways between the houses, through which the air can move freely, are to be preferred to unbroken blocks. However, the price of land and of building material may compel some in the larger cities to deny themselves any further separation from their neighbor than that afforded by a single brick wall. But under no consideration should residences be built back to back, without any open space between the kitchens of the two houses. Even a few feet of open yard are of great benefit in affording ventilation, and in preventing excessive dampness. The yard should be kept scrupulously clean, and it should be rendered as beautiful as circumstances will permit. In summer there is no place for children in their play preferable to a nice spot out of doors.

The arrangement of cesspools, wells, cisterns, and out-houses has already been discussed. None of these should be allowed to contaminate the soil or air of the yard. Trees not too dense or too near the house are beneficial in shutting off dust, and tempering the heat of the summer's sun. Besides, no other ornament about the premises can be more attractive than beautiful trees.

The location of all the out-houses of the immediate neighbors, as well as those directly on the premises, should be taken into con-

sideration. The yard should be so graded that the surface water will not collect about the foundations of the house.

A little care and a trifling expense in the surroundings will amply repay any family, and will increase one's love for what should be the dearest spot on earth—home.

THE CARE OF THE HOME.

Suppose that a location has been selected, a house built, and the surroundings prepared according to the foregoing directions, the next thing is to see that all is kept in a sanitary condition. Some families would convert the most scientifically constructed house into a den of filth. Cleanliness should be the watchword of every family. So far as sanitary needs are concerned, all the directions under this head might be condensed into the few words, "Keep everything clean."

Decaying vegetables must not be left in the cellar. Fresh air is to be admitted daily into every part of the house, from cellar to garret. Bed-rooms especially are to be thoroughly aired. Refuse bits of food are not to be left to mold on the pantry shelf, nor should they be thrown out into the back yard. Better burn them. Offal from the preparation of food is not to be allowed to remain in the house, nor is it to be thrown out. It must be placed in the swill barrel, or burned. Dirty dishes are not to go unwashed, nor filthy floors unscrubbed, nor soiled linen unlaundered.

Fresh meat, milk, and other foods are not to be allowed to remain uncovered in living-rooms or bed-rooms. The flour-box is to be kept free not only from the ravages of rats and mice, but from the dust of the room.

The drain from the ice-box should not be allowed to pass into a cesspool, sewer, or soil-pipe. Indeed, there should be no kind of connection between the ice-box, or other place in which food is kept, and any receptacle of waste matter.

The floors and seats of water-closets and earth-closets are to be kept clean. Drains and cesspools must be attended to. The supply of drinking-water must be kept free from every contamination.

Continued health is the reward for the care bestowed upon these details. The labor brings a rich return.

BUYING OR RENTING A HOUSE.

Great care should be exercised in renting or buying a house for family occupation. Many houses are now built purposely to rent or sell, and too many of these are constructed in a very flimsy manner. The object of the builder is to attract attention to his house, and money is spent in ornamentation, which should have been used in the more important parts of the structure. No one should place his family in a house until he has made a thorough investigation of its sanitary condition. The mere advertisement that "the house is furnished with the most approved sanitary appliances" should not be considered as a sufficient guaranty. Indeed, the statement of the owner or agent, that "everything is all right," is usually not to be relied on. The time will come when no one will be permitted to rent a death-trap in the shape of a house; but, unfortunately at present, the duty of seeing that everything is really all right devolves upon the person seeking a house. For this reason a few practical directions for house inspection may not be out of place here. The writer has known a man, even after having been warned by a former tenant, who placed his family in a house whose sole recommendation was its attractive appearance, and to regret his rashness a few weeks later when typhoid fever had stricken his family. The dangers to health and life are too great to allow anyone to be careless or indifferent in this matter.

The house offered for rent or sale should be visited by the one seeking a home, and thoroughly inspected in regard to its sanitary condition, as well as to its general appearance. The surroundings should be studied. The condition of the back yard,—especially the location of out-houses on the premises and those of the neighbors, the location and condition of cesspools, privy-vaults, cisterns, or wells, if such be present, should undergo careful inspection. What the sanitary arrangements should be has been already sufficiently indicated.

The cellar should be visited, and if its walls be cracked, damp, and covered with mold, if water stands upon its floor, and if light and ventilation are not provided for, seek some other habitation. It is better far, to sleep in the open air, with no roof but the sky and no bed but a few blankets placed on the dry earth, than to live in a house built over a reeking cesspool; and such a cellar is nothing more nor less than a cesspool.

The general construction of the house should be closely scrutinized. Observe the height of the first floor above the level of the street, the proportion of the lot covered by the house, the arrangement and size of the rooms, and the condition of the floors, ceilings, and walls. Of course newly constructed walls are always damp. A great amount of water is used in the mortar and plastering, and much of this must evaporate before the building is fit for occupation. Neither should a house freshly painted with lead paints be occupied until the paint is well dried. The living-rooms should be placed upon the sunny, airy side of the house. The bed-rooms especially should be examined with reference to their size and means of ventilation. The floors should be of seasoned wood, well jointed. This is very desirable, as it prevents the accumulation of dirt under the floors, and permits of the free use of water in scrubbing the upper floors without danger of injury to the ceilings of the lower rooms.

"Skin" houses, put up by "jerry" builders simply to rent or sell at the highest price, can usually be recognized by careful inspection. Extra ornamentation will generally be observed, but, if a few months have elapsed since its construction, doors will be noticed not to close tightly, the wood-work is shrunken, the window-sashes do not move easily, and too frequently the foundations have settled and the walls cracked.

If the house be furnished with any plumbing, this should undergo thorough inspection. A map showing the distribution of the pipes, unless all are in plain view, should be furnished by the owner. In many old houses large brick drains are found in the cellar. These are always bad. In them a great quantity of filth accumulates. They are seldom sufficiently flushed. Such a condition should lead one to reject a house for a residence. If the drain in the cellar be of earthen pipe, its joints should be examined, for they are often imperfect, and allow of the escape of both gaseous and liquid contents. In this way the cellar floor becomes impregnated with filth, and from it noxious exhalations rise into the rooms above. The writer has known of more than one instance in which one of these drains has been broken by settling, and the consequence was that a regular cesspool was formed instead of the drain. In one instance the break occurred near a cistern, and much of the chamber and and kitchen slops soaked through the imperfect cistern, polluting the water; and this was the probable cause of the typhoid fever

which attacked four of the inmates of the house. Still worse is the box drain made of plank. Often at the junction of the vertical pipe with such a drain, the wood decays, and a filthy cesspool is formed.

Unfortunately in most cities the sewers pass along the street in front of the house, and the sewage is collected in the back part of the cellar, and carried by a drain under the floor for the entire length of the cellar, passing out under the front wall on its way to the sewer. The best place for the sewer is in the rear of the house, but when in front, the drain should be carried around the house; or, if through the cellar, it should consist of an iron pipe freely exposed along its entire length, and with sufficient fall to give a rapid current. Its grade should be uniform, and free from depressions in which accumulations might occur.

The proper arrangement of the soil pipe has already been referred to. It should be of iron, not of lead. Leaden soil-pipes are often corroded and leaky. The ventilation of the soil-pipe should be by means of a pipe extending above the roof. The water conductor from the roof should not be made to do service as a ventilating pipe. Moreover, when the rain-water conductor empties into the soil-pipe the force of the current through it will siphon the traps above unless they are all ventilated.

The location of all traps should be ascertained, and it should be seen that none of the pipes are either clogged or leaky. The desirability of the separation of the water-closet from the bath and wash-bowls has already been referred to. It is not desirable to have even stationary wash-bowls in bed-rooms.

If there be a water-supply, it is well to see, before renting or buying the house, that all the pipes are in good order and so protected that they will not freeze. If the drinking-water be stored in a tank, see that the tank is not lined with lead. All water pipes should be well supported, or they may sag and break.

The inspection of the method of heating and ventilating the building may be made from the rules in regard to these points already given. The same is true in regard to the disposal of garbage and the construction of earth-closets.

TENEMENT-HOUSES.

Every working-man should strive to secure a home, and the tenement-house can never be a home in any proper sense. The privacy and comfort of a home can never be secured in a tenement-house.

Here people of all kinds are congregated, and the noise of the boisterous will disturb the rest of the quiet; the filth of the slovenly is likely to injure the health of those who endeavor to keep everything about them clean; and the habits of the immoral are distasteful to the moral. However, on account of poverty, many good people are compelled, for a time at least, to occupy rooms in a tenement-house. Unfortunately, the majority of such houses are built for the purpose of making as large pecuniary return to the owner as possible, and he cares but little about the character of his tenants or the manner in which they live, so long as their rent is paid. In the large tenement-houses of New York, all kinds of occupations are carried on, and many of them in the most slovenly manner.

The tenement should have a cellar under every part of it. The cellar should be divided into compartments by brick walls. No part of it should be used for sleeping-rooms, and it should be perfectly dry and well ventilated. The walls and floors throughout the building should be deadened. The halls should be lighted at both ends. They should be wide, and the space should not be encroached upon by using them as storage rooms.

Each water-closet should be thoroughly trapped and ventilated by a pipe extending above the roof. The ends of these pipes should not have return bends, nor be furnished with caps which are likely to obstruct the upward current.

The water-pipes from baths, stationary wash-bowls, laundry tubs, and sinks should have no connection with the water-closets, and should discharge into the open air outside the building over gullies, or should pass through air-traps outside of the house, the air-trap having a large ventilating pipe carried above the roof. In this way there will be no connection between the drain or sewer and the inside of the house, except through the ventilated soil-pipe of a trapped water-closet.

The floor and seat of every water-closet should be scalded with hot water and soap at least twice a week. There should be a separate closet for every fifteen persons.

The laundry work should be done in some special place, and not in the living or sleeping rooms. The water-supply should be abundant; and where the water-closets are used, not less than thirty gallons per day for each inmate of the house. Kitchens and bedrooms should be separate. The minimum amount of cubic space

allowed should be five hundred cubic feet per head, and this amount will answer only when ample provision for ventilation exists.

Each room should be lighted by outside windows or by light-shafts. The window sash should lower from the top as well as raise from the bottom. Each room must be furnished with a separate flue for ventilation, or a foul-air shaft, which should be heated. These shafts may be heated by being placed in the same chimney with smoke flues, or in case the entire building is heated by steam, a number of foul-air shafts may be brought together in the attic, and heated by a steam coil. If this is done there should be no means of cutting off the steam from this coil. The method of removing foul air, by means of a large central shaft, may do when there are conductors leading from each room to such a shaft, but when it depends upon the foul air from distant rooms reaching the shaft by means of open doors or through transoms, it will often fail. Moreover, all attempts to ventilate a number of rooms on different floors through the same flue or shaft, it matters not how large it may be, will always prove more or less of a failure; because on account of difference in temperature, the foul air from one room will often pass into another.

Various Sanitary Topics.

By A. G. Young, M. D., Secretary of the Board.

TUBERCULOSIS AND CONSUMPTION.

In the Fourth Annual Report of this Board and in the preceding reports, the results were given of the more important late investigations into the nature and causes of tuberculosis, and especially that form of human tuberculosis which we call consumption. The evidence presented since 1882, when Koch first announced his discovery of the *bacillus tuberculosis*, has been so plentiful and so convincing, that he who now declares his incredulity as to the infectious nature of this disease puts himself in an unenviable position.

But along with the establishment of the fact of infectiousness, we have made some substantial advances in our knowledge of the conditions and influences under which infection or immunity is the most likely to occur. We have learned

That tuberculosis or consumption does not occur except through the agency of the tubercle bacillus.

That the bacillus, though widely distributed over the earth, is not generally present in the atmosphere, as some other micro-organisms are.

That the multiplication and development of the bacillus can take place only in a human or animal body.

That the infection of a human being or an animal may occur as the result of breathing in the bacillus, swallowing it in food, or by inoculation through the skin, mucous membranes or otherwise.

That in man, at least, infection occurs, in the great majority of cases, by means of inhaling the virus.

That practically the only source of the inhaled virus is the sputa of consumptives.

That the sputa is harmless so long as it is prevented from drying.

That when dried it is readily pulverized and floated in the air as an invisible, but infectious dust.

That, though the infectiousness of the bacillus is positive and unquestionable, on account of its slow growth it implants itself in the animal organism with some difficulty and only after a considerable lapse of time.

That the power of the bacillus to invade the animal organism, and the power of the animal body to resist the attacks of the parasite are very nearly equally balanced.

That this balance of power may be destroyed, in a way unfavorable to the person or animal attacked, by the repeated re-infection of the system, or by inborn or acquired conditions of debility.

That this balance of power may, on the other hand, be destroyed, in a way unfavorable to the parasite, by conditions or influences which strengthen the general powers of the individual, and probably by conditions or treatment inimical to the bacillus.

That heredity as a factor in the causation of tuberculosis is much less operative than was formerly supposed.

It will be seen therefore that though tuberculosis is an infectious disease, the sources of the bacillus are so few and so well defined, the channels of infection are now so well known, and the growth of the bacillus is surrounded by such limitations, that we can very gladly exchange our former belief in hereditary influence and inevitable fate for the recent one of infectiousness and the preventability of infection.

The importance of this new direction for public health endeavor is of the greatest—is worthy to engage the earnest attention of statesmen as well as sanitarians. The field is broad and the modern tendency to press toward urban and manufacturing centres makes the need of work imperative. Consumption has aptly been called by somebody the "great white plague." One of the leading English physicians lately in speaking of the ravages of this disease in his own country has said:

Tubercle at the present day carries off annually nearly 70,000 persons in the form of phthisis, at the ages between fifteen and forty-five, the most useful stages of human existence; it kills more than one-third of the people who die, and nearly half between fifteen and thirty-five. Moreover, in its prolonged and painful course it either prevents its victims from earning their livelihood, or at least interferes greatly with their daily work. Its habit of seizing upon the flower of the population, its slow but almost certain progress towards death, the utter misery of the last few months or weeks of

existence—all these are features in the fell disorder that render its study all-important not only to medical men but also to the statesman and to all who are concerned with the welfare of the nation.*

In the German Empire from 170,000 to 180,000 die yearly from tuberculosis.† In our own country Dr. D. E. Salmon,‡ Chief of the Bureau of Animal Industry, estimates the annual number of human deaths from consumption at over 130,000; and the deaths from all forms of tuberculosis at 150,000.

CONSUMPTION AS AN INFECTIOUS DISEASE.

Since the publication of the last report, a large number of histories have come to my notice, mostly within the literature of the year in which the communicability of pulmonary tuberculosis is pretty well shown. The presentation of a few of them may serve a good purpose in helping to impress the fact, that the danger of infection is a real one.

Numerous experiments upon animals have shown that tuberculosis may readily be communicated to them by causing them to breathe air into which the tubercle bacillus has been diffused by the atomization of tuberculous matter, or of the pure artificial cultures of the bacillus. That tuberculosis may be communicated to human beings in the same way, the fool-hardiness of one person, at least, has shown. While Tappeiner was engaged in his inhalation experiments upon animals, he was assisted by a servant in his fortieth year, who had always been very strong and healthy, and was absolutely free from suspicion of hereditary taint. In spite of energetic and repeated warnings to keep out of the inhalation room this man, to show the freedom from danger in doing so, persisted in entering the room. In this way he acquired the same form of inhalation tuberculosis which he had so often seen given to dogs, and he died fourteen weeks afterwards. The post-mortem showed the same changes which had been previously found in the dogs that had been subjected to the experiments.§

Recently Vallin, in the French Academy of Medicine, told about a family, whose home the arrival of a consumptive brother transformed into a "house of the doomed," where five persons died of

*Lancet I, 1890, 551.

†Centralblatt für al. Gesundheitspflege, VIII, 255. 1889.

‡Trans. Amer. Pub. Health Assoc., XIV., 92.

§Zeit. für Hygiene, V, 209.

consumption within three years. The family, living in the country in easy circumstances, consisted of father and mother, both of more than sixty years of age, but very healthy, and five children at ages from twenty-five to thirty-two years. The eldest son living in Paris, became consumptive, and, returning to the home of his parents, died in about six months. Within the two years that followed, there died in rapid succession, a sister of thirty, another of thirty-two, a third of twenty-seven, and finally a son-in-law, husband of one of these young women, who had continued to live with the rest of the family after his wife died. It may be added that the sisters who became infected occupied successively the same chamber in which their dead brother had passed the last month of his sickness. Ten years later the father died of apoplexy, and the mother was then living without a trace of tubercle.*

Dr. A. Ollivier,† physician to l'Hôpital des Enfants Malades, Paris, states that a family previously in robust health occupied two small rooms opening into a narrow court. The parents, a young son, and the baby, slept in one of the rooms. An older son, who had been living elsewhere contracted phthisis, returned home, and slept in the same apartment. He died January 16, 1883. His mother, who was constantly at his bedside, began to cough, emaciated and died of the same disease in the following May. Seven days after the death of the mother, her infant had tubercular meningitis, of which it perished, and a little later the older child who occupied the same apartment, sickened and died like the mother. The father only remained of those who occupied the small room, and his immunity was probably due to the fact that he was most of the time in the open air.

Dr. E. I. Kempf relates the following striking instance of infection (Louisville Medical News, March 22, 1884). In the fall of 1880, a girl of eighteen years, whose brother had died of consumption, was found to have tubercles at the apices of both lungs. She belonged to a sisterhood, and slept in the general dormitory with the other sisters. In four months nine of her companions began to cough, and were found to have tubercles. No one of the sisterhood had previously had disease of this kind.‡

Dr. Marfan§ gives an account of a local epidemic of pulmonary consumption which appears to have been due to infection. In the centre of Paris an office gave employment to twenty-two clerks. The wooden floor was old and uneven, and the building otherwise was far from being in a sanitary condition; but there appears to have been no cases of consumption among the employes before the one of which we are to speak. In 1878, a man who had been in the office twenty-four years, died of consumption after a sickness

*Revue D' Hygiene, XII, 56, 1890.

†Medical News, LV, 651, 1889.

‡Ibid.

§Semaine Med. quoted in Revue D'Hygiene, XII, 66, 1890.

of three years, during all of which time, excepting the last six months, he had been at his desk in the office, coughing and spitting upon the floor. Since this time, of the twenty-two employees, fifteen have died, one of cancer, and all of the others of consumption. Before the death of the first case, two other men who had been in the office six years, began to cough and spit upon the floor. They died in 1885. For a while the deaths succeeded each other at frequent intervals, the decedents having been in the office for periods of from two to twenty years. It appears to have been the custom to have the office swept every morning, and the sweeping was not usually completed before the arrival of some of the employees. When Dr. Marfan, head of the medical clinique of Paris, advised the office that the probable cause of the heavy mortality had been the inhalation of the infectious dust from the floor, the floor was promptly removed and burned and a new one laid. In future, the sweeping is to be done evenings after the departure of the clerks, and other precautions against the continuance of the trouble were taken.

INFECTION FROM THE ALIMENTARY CANAL.

In the preceding cases it is presumable that the infection was due to the inhalation of the virus,—the breathing in of the dried and pulverized sputa. In the following cases the infection was from the alimentary tract.

Dr. W. J. Wilson* observed the following case: B. W., aged four months; family history good, and no trace of phthisis or syphilis discoverable in either family. Had had no previous illness, was plump, fat, and well-nourished. The mother was forced to wean the child when about a month old, and it was fed on cow's milk from a bottle, and thrived well for a time, having no digestive troubles. It was attended by a nurse, who was well advanced in consumption, and had free expectoration. The child slept with the nurse, and, consequently, was much exposed to her breath. Nothing unusual was noticed in the child's condition for the first three or four weeks after the nurse's arrival, when it began to loose flesh and cough slightly. This cough and wasting gradually increased, and finally Dr. Wilson was called in. On examination he found well marked and far advance phthisis, with frequent cough and great emaciation. The child died in its eighth month, three months after the first symptons were noticed. The same nurse who, later on died of consumption, attended five other children, and four out of the five died of some wasting disease, but as Dr. Wilson did not see any of them he was unable to state its nature.

*Canadian Practitioner, quoted by Health Journal, XI., 116.

A case of infection of an infant through the milk of a tubercular nurse is reported by Dr. Steinberger* of Buda-Pesth. An infant aged five months, of healthy parentage, developed caseating cervical glandular abscesses, of a distinctly tubercular kind. Microscopical examination verified the diagnosis. Inquiry elicited the fact that the infant had been nursed for a period of four weeks by a woman who had been discharged on account of phthisis, with abundant expectoration. The etiological relationship was thus clearly established.

Prof. Demme† of Berne has published the following interesting case:

A four months old boy died of tuberculosis of the mesenteric glands. The microscopic examination of the swollen glands which were partly caseated showed the presence of the tubercle bacilli. In the intestinal mucous membrane, as well as in other organs, small localizations of tubercle were discovered. Neither on the side of the parents nor of the grandparents had any cases of tuberculosis ever occurred. On the other hand the child had been fed from birth with the uncooked milk of a cow which was fed upon dry fodder. After the death of the child the physician ordered the cow to be killed. The finding was interesting and instructive. In the left lung of the cow, medium-sized tuberculous nodules were found containing tubercle bacilli. The microscopical examination of the milk, pressed out from the deeper portions of the udder, also revealed the bacilli.

Heller‡ believes that very probably milk plays a principle part in the so-called hereditary tuberculosis of children. In favor of this view is the fact of the frequency of tuberculosis of the mesenteric glands, just that part of the lymphatic system which must be first affected by the tuberculous virus when introduced into the intestinal tract.

Observations like the foregoing and the results of feeding experiments on animals have shown the danger from the use of milk, from suspicious sources, and have led to attempts to determine the magnitude of the danger. An answer was needed to the question whether the milk becomes infectious before the tubercular disease of the cow becomes generalized, and as Bang of Copenhagen and others had called attention to the fact that tuberculosis of the udder in the cow is not a rare occurrence, an answer was needed to the question, may the milk become infectious in the absence of tubercular formations in the udder? Hirschberger's recent experiments throw considerable light upon this matter.

*Pesth. med. chir. Presse, quoted by Health Journal, XI., 116.

†Schweiz. Blätter fur Gesundheitspflege, III., 95. 1888.

‡Deutsche Viert. für öffent. Gesundh. XXII., 94. 1890.

He sought to answer two questions: 1. Are the cases frequent or not in which tuberculous cows furnish an infectious milk? 2. In what forms of tuberculosis is the milk infectious? He experimented with the milk of twenty cows affected with tuberculosis of various grades. The milk taken with the necessary precautions was inoculated into the peritoneal cavity of guinea-pigs. His answer to the first question is that the danger of infection from the milk of tuberculous cows is not only present but it is a very great one; in 55 per cent. of all the samples experimented with, the milk was shown to be infectious. In answer to the second question, his results show that the danger of the infection is greater in advanced cases, in which the disease is generalized, but that it also exists in those cases in which the disease is entirely local. From tuberculous cows in which the wasting is marked, the milk is generally infectious; from those that were in good order, he found 30 per cent. to be infectious. The milk from 80 per cent. of advanced, 66 per cent. of medium grades, and 33 per cent. of localized tuberculosis, was found to be infectious.*

The Massachusetts Society for the Promotion of Agriculture employed Dr. Ernst to investigate the question, as to the danger from the use of the milk from tuberculous cows and at what stage in the disease the milk becomes infectious. Thirty-six cows suffering from tuberculosis other than of the udder were used in the investigations, and 114 samples of milk from them were examined; seventeen samples from ten different cows were found to contain the bacilli of tuberculosis.

Well animals were then inoculated with the result of inducing the disease in 50 per cent. of the cases subjected to the experiments. Feeding experiments were also made, with the result of inducing the disease in a number of calves and young pigs. The following conclusions were presented: 1, and emphatically, that milk from cows affected with tuberculosis in any part of the body may contain the virus of the disease; 2, that the virus is present, whether there is disease of the udder or not; 3, that there is no ground for the assertion that there must be a lesion of the udder before the milk can contain the infection of tuberculosis; 4, that on the contrary, the bacilli of tuberculosis are present and active in a very large proportion of cases in the milk of cows affected with tuberculosis, but with no discoverable lesion of the the udder.

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*Deutsche Med. Woch., XVI., 113. 1890.

It will thus be seen that Dr. Ernst's results and conclusions are essentially the same as those to which Dr. Hirschberger arrived.

The Tuberculosis Congress in Paris spent much time in the discussion of the question as to the permissibility of using as food the flesh of tuberculous animals in the earlier stages of the disease. There was a difference of opinion as to the expediency of absolutely interdicting the use of such meat. Recognizing the difficulty of drawing a line to divide the cases in which the flesh may be used from those in which it may not be used, the Congress eventually passed a resolution to the effect that all animals affected in any degree with tuberculosis should be seized and condemned as unfit for food. This was carried with only three dissenting votes.*

At Munich some experiments have been made by Steinheil† as to the possibility of infecting guinea-pigs with the products from the muscles of persons affected with phthisis. The material used was portions of the psoas muscles of nine patients, who died of phthisis. The muscle was cut up into very fine pieces, and submitted to the pressure of a screw press. The juice obtained was injected into guinea-pigs. Of eighteen guinea-pigs thus treated, fifteen died of tuberculosis, although no tubercle could be detected in the muscles so used. Steinheil draws the conclusion, that the muscular flesh in advanced human phthisis is infectious as a rule; hence, the possibility that the flesh of animals affected with bovine tuberculosis is dangerous, cannot be denied.

‡Kastner undertook a similar research as to the infectiousness of the muscles of tuberculous cattle.

Infusions of the meat were injected into the peritoneal cavity of guinea-pigs. Out of sixteen animals thus treated, twelve remained healthy. He concludes that special dangers from infection are not to be feared, save in the rare cases, in which tubercles are to be found in the muscles.

From the juice pressed from the meat of a cow seized on account of local tuberculosis, but fat and in good condition, Veyssiere inoculated two rabbits and caused tuberculosis in both.§

Drs. Straus and Würtz presented a communication to the Tuberculosis Congress on the action of the gastric juice upon the tubercle bacillus. Experiments made by them had shown that prolonged action of pure gastric juice upon the bacilli was necessary in order to destroy their virulence. The time required was at least six hours. It was, therefore, useless to expect that the bacilli could be destroyed by this secretion after their introduction into the human stomach.§§

*Medical Record, XXXIV., 218. 1888.

†Public Health, II., 285. 1890.

‡Public Health, II., 231. 1889.

§Medical Record, XXXIV., 218. 1888.

§§Medical Record, XXXIV., 251. 1888.

TUBERCULOSIS FROM INOCULATION.

A third way in which the tubercle infection may be received is by inoculation, and the following cases show how accidents of this kind may occur.

Nocard,* in the discussion on tuberculosis, mentioned that Moser, a veterinary surgeon of Steiner, died from a tuberculous infection received while making a post-mortem examination of a tuberculous cow.

Dr. Lesser† of Leipzig gives the history of a case of inoculated tuberculosis in a woman who washed the clothing of her consumptive husband.

The infection resulted in a tuberculous growth the size of a cherry on the lower part of the right forearm. Its removal was followed by tuberculous granulations which healed after their removal by scraping. Lesser also refers to a case of Merklen's, in which the inoculation occurred on the fingers and advanced to general and fatal tuberculosis. The patient was a woman who for six months had washed the clothing and the spittoons of her consumptive husband.

The same author referred to the cutaneous tubercles which are seen on the faces of children not so very rarely, and which are to be regarded as tuberculosis. Several cases of the kind are given. Most of the cases of inoculation of tuberculosis of course occur on the sites of abrasions or wounds of the skin, but Lesser thinks infection is possible by the way of the sweat glands in the uninjured skin.

As to the future results of such subcutaneous inoculations it is said that from no other point does the tubercle bacillus find so much difficulty in invading the general system as from the skin. Many of the cutaneous tubercles disappear spontaneously, and, if the virus reaches the nearest lymphatic glands it may there remain stored up for months or years, or even for the whole lifetime without leading to general tuberculosis.

Dr. Gerber‡ of Königsberg relates his own unfortunate inoculation with tubercle virus while making the section of the lungs of a patient, in November, who had died of consumption. In so doing he received a slight cut on one of his fingers. Pain and febrile symptoms of short duration followed, and a tumor the size of a

*Revue D'Hygiene, XII., 49. 1890.

†Deutsche Med. Woch. XIV., 502. 1888.

‡Deutsche Med. Woch. XV., 322. 1889.

cherry formed on the site of the cut. The local tubercular growth was exercised in March following. Soon afterward the glands in the arm-pit began to swell and eventually formed a mass larger than a goose egg. In the meantime the doctor had fallen into a hectic condition with a remarkable depression of the nervous system. In May the radical extirpation of the infected glands was undertaken and a cure was effected which seemed to be permanent.

During the past year Dr. Cornet of Berlin, has made some investigations to determine the points of entry of the virus in tuberculous infiltration of the glands.

He showed some guinea-pigs into whose conjunctival sacs some sputum containing tubercle bacilli had been placed. No injury of the sac took place. Notwithstanding this, the bacilli grew, penetrated the tissues, and set up swelling and hyperplasia of the conjunctiva. In all the animals caseation and softening subsequently took place in the neighboring glands. The side on which the inoculation took place showed the most extensive changes. In two other animals the nasal mucous membrane was painted by means of a pigeon's feather, with bacillary sputum in one case, and a pure cultivation of tubercle bacilli in the other. The corresponding glands became tuberculous in both cases. In other cases the cavity of the mouth was inoculated with sputum or pure cultivation material, and all the corresponding glands became tuberculous. In another guinea-pig infective material was introduced into the ear and the auricular glands became subsequently caseous. In still another animal the skin over the nose was shaved clean and sputum rubbed in, when later on a serpiginous ulcer covered with a thick scab, reminding one of lupus, was observed, the cervical glands became much enlarged. Another animal was scratched on both cheeks with a finger-nail dipped into tuberculous sputum, and the ulceration, covered with scab, that followed, spread and became confluent. Another animal was rubbed, but without abrading the surface, with a wash leather that had been dipped into bacillary sputum; after some weeks it was killed, when the corresponding lymph-glands were found enlarged. He concluded that tubercle bacilli could penetrate into the system without causing distinguishable injury at the point of entry. The nearest lying glands became tuberculous and illness developed resembling scrofula as it was often seen and without doubt scrofula depended on a tuberculous infection from without. This was less remarkable when we remembered how incautiously we treated phthisical sputum, and how frequently children made a way for the entrance of disease by putting every possible object within their reach, covered with tuberculous dust it might be, into their mouths, up their noses, or into their ears.*

Other ways than those suggested in the foregoing histories are conceivable in which tuberculous infection may take place by the

*Medical News, LV., 69. 1889.

way of the alimentary canal or by infection. Carelessness and want of cleanliness on the part of consumptive patients or their attendants, may transfer the infective agent to human food or drink, or to abraded skin or mucous membrane. To illustrate how much æsthetics has to do with hygiene, Cornet relates that he once observed a neat appearing young lady from aristocratic circles, who was a consumptive, go to the table without washing her hands, soon after she had smeared her fingers with her expectoration. Heller* has told something that will help us to understand the sanitary significance of such acts of carelessness. Counting under the microscope the b cilli in one cubic millimeter of the sputum of a consumptive patient he found one million germs. On this basis he estimates that three hundred million bacilli on an average are thrown out at each expectoration of a consumptive patient. In none of her realms does nature show a greater prodigality than in her department of bacteriology. Though millions are wasted, one seed may fall upon congenial soil, and a human life may be the price of a thoughtless act.

AUTO-INFECTION.

By referring to Circular No. 54, Prevention of Consumption, republished on page 32 of this report, it will be seen that an emphatic warning is given the consumptive patient against the danger of reinfecting himself with his own sputum, thus defeating the effort that nature always makes to bring about a spontaneous cure. Many consumptive patients show at some stages of the disease marked signs of improvement, and the physician and friends are greatly encouraged with the hope of a recovery, only later to feel a bitter disappointment.

A careful observation of these phenomena has convinced Dr. Flick† that they are not the result of taking cold, but of auto-infection. He relates several cases which had something to do with bringing him to that conclusion, and proceeds as follows: In these and other similar cases there was no exposure that could have accounted for the sudden change in the course of the disease. In none of the cases did the change come in extremely cold weather, and in one it came during the summer. Taking cold, moreover, would not satisfactorily account for the phenomena, as in each case there were new centres of disease, and taking cold should only have affected the old centre. Auto-infection not only gives a proper

*Deutsche Vierteljahrsschrift für öffent. Gesundheitspflege, XXII., 88. 1889.

†Times and Register quoted by N. Y. Medical Times, XVII., 231. 1889.

explanation of these and all similar cases, but renders intelligible many clinical facts about phthisis which are otherwise hard to understand.

Were it not for auto-infection I believe that most cases of tuberculosis, at least most cases in which the disease is outside the cranium, would get well. In every case which has ever come under my notice there was a decided effort on the part of nature to establish a cure, and in proportion as the victim had retained his powers of digestion and assimilation she made a good, bad or indifferent struggle against the disease. In her very effort, however, seems to lie the danger, for by trying to resolve the tubercular deposits she is liable to start up new centres of disease.

Dr. Mosler refers to another kind of danger of self-infection to which consumptive patients subject themselves, that is by swallowing their expectoration.

In one case, which he treated in hospital, the patient, who was rather stupid, could not be persuaded into ejecting the sputum, but invariably swallowed it, in quantities which other symptoms showed to have been very great. Ten days after his first attack of cough with expectoration, diarrhoea and severe colic came on, which was relieved by opiates and other appropriate remedies, but which, nevertheless, kept on until death, which occurred in eight days. Distinct signs of tubercle were found in the lung, but in no other part of the body except abundantly in the intestines. Mosler attributes the presence of tubercle in the intestines in all cases, more to the swallowing of the sputa than to a general infection.*

"PHTHISIS NESTS."

Observation teaches that consumption often shows a tendency to endemicity, or in other words, that the infection has the power of clinging somewhat tenaciously to localities.

Referring to the tenacity with which the infection will cling to places where consumptive persons have dwelt, Liebermeister† says that he has known many instances in which families, hitherto exempt from this disease, developed it after moving into houses formerly occupied by consumptive patients.

Dr. Flick‡ of Philadelphia, as the result of an elaborate topographic study of phthisis in that city, comes to the following conclusions: (1) that a house which has had one case of consumption will probably have another within a few years, and may have a large number in close succession; (2) that when a case of consumption occurs in a house, approximate houses are considerably

*Med. Record, XXXV., 15. 1889.

†Deutsche Med. Wocheuschrift, XIV, 545, 1888.

‡Lancet, 1, 1890, 588.

exposed to contagion; (3) that houses in localities where endemic after endemic has existed have, nevertheless, escaped the disease; (4) that tuberculosis of different kinds occurs in the same localities and often in the same lots as consumption; (5) that during twenty-five years scarcely twenty per cent. of the houses of the ward were so affected. He ascribes these results to contagion in the houses themselves, and these facts must be placed in apposition with the researches upon the bacillus-holding properties of the walls of houses in which consumptive patients have resided.

Dr. Ransome* has an interesting paper on "Tubercular Infective Areas" in which the same idea is brought out.

IS TUBERCULOSIS A HEREDITARY DISEASE.

Hiller† concisely sums up the evidence against heredity as a cause of consumption.

It is evident that the possibility of the hereditary transmission of tuberculosis cannot be doubted; experience has presented a seeming evidence of probability and recently a very few cases of fœtal tuberculosis in calves have been related, only one of which, a case by Johne, is to be regarded as unquestionable. The rarity however, of congenital tuberculous in calves is shown by the records of the slaughter-houses. For instance, during the last year over thirteen per cent of all the cows killed in the slaughter-houses at Kiel were found to be tuberculous, while among 6,300 fatted calves only five in all, or .079 per cent, and among 8,300 calves not fattened, not a single one was found tuberculous.

With man thus far, according to the universal experience of pathological anatomists, not a case of fœtal tuberculosis has been shown; the few reputed cases are referable to other diseases. Among 300 still-born children which in part were from tuberculous mothers, I have found not a case of tuberculosis. Among the mothers there were two particularly with the disease far advanced though the children were well developed and entirely free from tuberculosis.

The further proof that heredity plays no role in human tuberculosis, is offered by Table II,‡ which shows that tuberculosis in infancy first appears when sufficient time has passed after birth for the bacilli which have been introduced into the system to be developed, thenceforward, however, the frequency of tuberculosis increases rapidly. Among 541 nursing children before the age of nine weeks, I have never found but one case of tuberculosis, that in a nine weeks old child, and in this one of meningeal tuberculosis.

The innumerable experiments upon animals since Villemin's work was done, have, however, shown that the introduction of tuberculous

*Trans. of the Epidemiological Society of London, VI., 124.

†Deutsche Viert. für öffent. Gesundheitspflege, Band XXII., 88. 1890.

‡Omitted here.

material into healthy animals leads to the development of tuberculosis within a few weeks. Among tuberculous animals, in many examinations, I have succeeded no better than Koch and other observers in finding tuberculosis in the first few weeks of life.

Observations of other kinds also negative the significance of heredity in tuberculosis, particularly the investigations of Epstein, in which the children of consumptive mothers given to healthy wet nurses escaped the disease, while those nursed by their own mothers died tuberculous.

Similar testimony is given by well arranged orphan asylums, the occupants of which are in great part the children of parents who have died of consumption. According to Stich, only one case of tuberculosis occurred in the Nuremberg Orphan Asylum in eight years, and in the Munich Orphan Asylum, among 613 children, in twelve years, only one case, although more than half of the children had lost father or mother, or both, from consumption.

So, in man, we may entirely disregard hereditary as a cause of tuberculosis, for, if it occurs at all, it has an extremely slight practical significance. The teaching of the hereditary transmission of tuberculosis is only a perversion of the fact, that in numerous families tuberculosis carries away many members, a fact which is more easily explained by assuming that a consumptive member of a family is in a position to infect other members by his plentiful distribution of bacilli. It cannot be denied, however, that through congenital or other influences, some persons have a lesser power of resistance than others against the bacillus of tuberculosis, and this is true as regards other infections.

INFLUENCE OF CLIMATE ON CONSUMPTION.

In this State there is an opinion somewhat current, which I believe is erroneous, that our rather severe and changeable climate has a tendency to increase the prevalence of consumption. In the complete absence of any provisions for the collection and record of deaths and their causes, we have no way of positively deciding this question, but reasoning with the help of the vital statistics of our neighboring states, we are able to guess that our tubercular death-rate is rather below the average. New Hampshire with its improved system of collecting and recording deaths, has shown that its mortality from consumption is very low in comparison with that of the more thickly populated New England States.

Dr. J. Edward Squire* of London expressed the opinion before the Epidemiological Society, "that the influence of climate upon consumption is infinitesimal as compared with the effect of density of population."

*Lancet, Vol. I., 1889, 174.

In a lecture at the Royal College of Physicians, Dr. Ransome* said:

In all the chief cities of Europe, Asia, Africa and America there is but little difference in the phthisis rate, and what differences exist are not to be accounted for by differences in climate. Army and navy returns impel us to similar conclusions. And again he says, we have already seen reason to conclude that the ancient doctrine of its origin in a damp, changeable climate is erroneous; and if we take the extreme variations of the disease in places geographically close together, we shall find that they are so great and so frequent in different countries that they could not have been due merely to differences in climate.

The same author referring to certain parts of the globe in which tuberculosis is but little prevalent says:

The last group of districts to a great extent exempt from consumption consists of the arctic and subarctic countries. We do not know why extreme cold should be antagonistic to consumption, and the fact is entirely opposed to the notions of our forefathers on the subject.†

A Russian writer, Dr. Worms‡ of Riga, while emphasizing the fact that in the treatment of consumption, our attack upon the disease must be indirect, that is, by the invigoration of the body by an abundance of nutritious food and the constant breathing of pure air, has, also, the idea that a direct action may be brought to bear upon the bacillus tuberculosis by the means of cold air; since it has been shown that the bacillus flourishes only between very limited ranges of temperature, the most favorable temperature being 37.5° (99.5° F.). He would have patients, protected by an abundance of wraps, breathe continuously during the day the out-door winter air, and at night sleep with the bedroom window open.

On the other hand, some regions formerly free, or nearly so, from consumption have suffered an increase in the prevalence of the disease due to an increased density of population, in some instances, and to importation of the tubercular virus in others.

According to M. V. Widal,§ formerly medical inspector of the army, consumption was almost or quite unknown in Algeria before and during the early years of the French occupancy of that country. In 1832 a case of phthisis was a rarity. From 1853 to 1867 M. Widal did not see more than twenty cases in the aggregate. Since the latter date, matters have changed. From 1882 to 1886 the military hospitals of Algeria, taking patients from both the civil and the military population, have received 2,934 tuberculous patients, not including European and native residents treated at

*Lancet, I, 1890, 586.

†Lancet I., 1890, 587

‡Deutsche Med. Wochensch. XV., 263, 1889.

§Revue D'Hygiene, XII, 60, 1890.

their own homes. Dr. Widal thinks that tuberculosis was imported into the country as typhoid fever was, which he says was unknown earlier.

In a notable discussion on tuberculosis before the Academy of Medicine, in Paris, Cornil cited what he claimed as a fact, that consumption did not exist among the Fuegians before the installation of the English mission in their country. The wife of the pastor, who was phthisical, had collected in a school a certain number of children. These young Fuegians were lodged, clothed, and placed under apparently better hygienic conditions than those who still lived in a savage state. Notwithstanding this, a terrible mortality occurred among the former. There was a veritable epidemic of acute phthisis.*

Liebermeister† is authority for the assertion that almost invariably savage peoples are free from tuberculosis, until they have come into association with civilized races. He says that tuberculosis is unknown to the negroes of Central Africa, while, among those who have come in contact with civilization, the disease is more prevalent than among other people. He reminds us also that the Indians of North America and the natives of the Australasian Islands were free from consumption before European immigrants came.

THE CURABILITY OF CONSUMPTION.

Though consumption is the most destructive disease of modern times, the study of statistics teaches the encouraging fact that the gradual improvement which has taken place in the sanitary condition of civilized peoples has resulted in a diminution in the death-rate from consumption. This is shown by the mortality reports of Massachusetts, and the same truth is taught by a study of the English statistics. But otherwise there are grounds for encouragement. The dictum of that brilliant medical authority of an age just passing, Sir Thomas Watson, that "tubercular disease when established is beyond our power," has not even to this day been widely disputed. There are, however, encouraging signs that the scientific investigation of the present day is rearing upon the foundations of the past, a knowledge which will lead to a more rational and more successful management of this disease.

*Lancet, II, 1889, 1316.
†Deutsche Med. Wochenschrift, XIV, 544, 1888.

Before the French Academy of Medicine, Vallin* declared last year that "it is less dangerous to be tuberculous in 1889 than it was in 1840; many patients are cured now a-days, and we can assure them a long existence by a life in the open air."

THE OPEN-AIR TREATMENT OF CONSUMPTION.

The last lines in the foregoing quotation from Vallin express the direction in which the cure of consumption is now sought with the most reasonable hope of success. The discovery of the bacillus tuberculosis led to the fond hope that some agent would soon be found which could be used for the sure destruction of the parasite, without injury to the organic cells which constitute, in the aggregation, the higher organism preyed upon. This hope thus far has not been realized, and we have been driven again to an appreciation of those natural agencies, out-door air, sunshine and nutrition, the value of which have not received due recognition

In 1887, at the meeting of the American Climatological Association, Dr. E. L. Trudeau,† of Saranac Lake, N. Y., read a paper on "Environment in its Relation to the Progress of Bacterial Invasion of Tuberculosis," in which he narrated some experiments made the year before. Fifteen healthy rabbits were inoculated with a pure culture of the tubercle bacillus. Five of these were subjected to overcrowding in a dark cellar with insufficient food. All of these became tuberculous. Five were placed in a box and lowered into a damp pit dug in the ground, and given a limited food supply. All were alive and active at the end of four months. They were killed and were found not to be tuberculous. The last five were turned loose on a small island where they had abundant sunlight, fresh air, and exercise. They were daily supplied with wholesome food. Of this last series, one died at the end of one month tuberculous; the remaining four were killed at the end of four months. They were fat and all the organs were normal.

The following year the experiment was repeated with some variations and Dr. Trudeau‡ reported to the association as follows:

On June 10, 1887, six full-grown, healthy rabbits, were inoculated in the right lung with a quantity of a pure culture of the tubercle bacillus, as nearly as could be estimated, at least twice as large as

*Revue D'Hygiene, XII, 53, 1890.
†Sanitarian XIX., 99. 1887.
‡Medical News, LIII., 466. 1888.

that made use of in the experiment of 1886. They were at once turned loose on the same island and supplied with an abundance of food throughout the entire summer. After being permitted thus to run at large for four months, three of them were killed, while the remaining three were placed in a box and spent the following four months in confinement in a sandy pit, on a moderately restricted diet. At the expiration of four months more they too were killed and their organs examined.

Lot No. 1. Killed as soon as removed from a favorable environment. In one no sign of disease, in a second, a thoroughly localized tubercular lesion, and in the third, advancing and extensive tuberculosis of both lungs.

Lot No. 2. Killed four months after removal from favorable to less favorable surroundings. In one animal a localized cavity resembling a cystic tumor in the lung at the point of the injection. The fluid of the cavity contained a few bacilli. Otherwise every organ perfectly healthy and the general nutrition was excellent. In the second rabbit all the organs were normal. In the third, old and stationary tubercular lesions were found on the pleura, but the lungs and all other organs were normal. The beneficial influence produced by a good environment on the course of the tubercular affection as evinced by the arrested lesions of the last rabbit, seems to have maintained for four months in spite of their removal to less favorable surroundings.

Before the Congress for the study of Tuberculosis M. Calmette read a paper on "The Evolution of Tuberculosis in Healthy Surroundings".* His observations were confined to Belle-Isle-en-Mer, an island lying eight miles from the mainland. The course of the disease is modified by the healthful surroundings, being very slow. Often the infection lies quiet for five or six years, then seeming to have acquired more strength, proceeds slowly, without hectic symptoms.

The British Medical Journal (of November 16) in an editorial advocating this "open-air treatment" says:

"Among the many changes which have taken place in the treatment of phthisis in the last forty years, none is more marked than the substitution of a system of bracing and hardening the patient for one of 'coddling', and foremost in this plan is the principle of open air, or exposure of the patient as much as possible by day and by night to the influence of the atmosphere. The great object of change of climate is to afford greater facilities for this process, and it appears from the testimony of most authorities that the meteorological phenomena which interfere with the success of the system in England are not the coldness of the climate, but its humidity and the prevalence of fog and mist, and the fear of exposure to these elements prevents it being completely carried out here. There is

*Medical Record, XXXIV., 250. 1888.

no question now that cases not only of non-pyrexial (without fever) but also of pyrexial phthisis are favorably influenced by open air treatment, which produces a diminution of the troublesome symptoms, such as high temperature and night sweats. It is doubtful whether in England we are sufficiently alive to the advantages of the open-air treatment in phthisis, for though in our palatial hospitals the systems of ventilation and warming have been carried to a high state of perfection and without draught, the exposure of the consumptive patient on a terrace or balcony to the sun's rays and free breezes of heaven would probably be far more beneficial, provided the effects of chill and damp were guarded against."

An English physician† relates the case of a young man who had advanced phthisis pulmonalis with cavities. His case was considered hopeless, and, despair making him reckless, he gave up all treatment, went to the west of Ireland, spent his days shooting over the mountains, taking no precautions against cold, wet, or over-fatigue. The result was he improved and practically recovered, living for many years afterward.

Dr. Neale‡ gives the case of a patient aged 24, with great emaciation, rapid pulse and high temperature, scanty expectoration often highly tinged with blood, and a distinct cavity on right side, the left lung being fairly healthy. Weight 116½ pounds. The family had had considerable experience with such cases and agreed to the open air treatment. A large room facing south, and in a house in an elevated situation was selected and cleared of all furniture except the bare requisites. The bed was sheltered from draughts, the windows left wide open at the top, the door left open, and other doors and windows communicating were also left open. Woolen for the whole body was worn day and night. Food was given plentifully and medical treatment was given at the same time. In less than two months there was but seldom a slight tinge in the expectoration and the lungs showed evident signs of repair. The weight was then 125 pounds. The patient then went to Australia.

Dr. H. I. Bowditch§ of Boston read an interesting paper at the meeting of the American Climatological Association to show the great value of "open air travel as a curer and preventer of consumption, in the history of a New England family."

The family under consideration is that of which the author is a member. At the age of thirty-five his father was undoubtedly threatened with consumption, having cough, hemoptysis, anorexia, diarrhœa, and general malaise, with fever and great debility. In

*The Health Journal, XI., 220, 1889.

†Medical Press and Circular, XLVII., 408, 1889.

‡British Medical Journal quoted by N. Y. Medical Times.

§Medical News, LV., 343. 1889.

this condition he set out with a friend as his companion and driver, in an open one-horse chaise for a tour through New England. After the first day's travel of twenty-five miles he was so much exhausted and had so much bleeding from the lungs, that the friend was advised to carry him home to die. The travelers, however, were both plucky and kept on, and soon every day's travel brought improved health. In this journey he traveled 748 miles, going "down into Rhode Island, thence by the way of Connecticut up through the hills of western Massachusetts to Albany and Troy, and back through Massachusetts to New Hampshire, Vermont and Maine, and then to the home from which he started."

The benefit which he derived from this journey had proved to him the absolute need he had of regular daily exercise in the open air. Afterward, under daily walks of one and a half to two miles, taken three times daily during thirty years of life, all pulmonary troubles disappeared. He died in 1838, from cancer of the stomach, one lung presenting evidences of an ancient cicatrix at its apex, both being otherwise normal. He was sixty-five years old—i. e., thirty years after the journey. Dr. Bowditch tells us that his father married his cousin, who, after long invalidism died of chronic consumption in 1834. Notwithstanding the strong predisposing influence to lung disease which would result from such a union, six of their eight children either reached old age or adult life and were married and have had children and grandchildren, but not a trace of consumption has appeared in any of these ninety-three persons.

This remarkable immunity from consumption Dr. Bowditch attributes to the fact that his father, having experienced in his own case a vast benefit resulting from constant, regular exercise out of doors, apparently determined that his children should be early instructed in the same course. Daily walks were required as soon as the children were old enough and "if any of us, while attending school were observed to be drooping, or *made the least pretence* even to being not '*exactly well*' he took us from school, and very often sent us to the country to have farm life and out of door play to our heart's content. In consequence of this early instruction all of his descendants have become thoroughly impressed with the advantages of daily walking, of summer vacations in the country, and of camping out, etc., among the mountains. These habits have been transmitted, I think, to his grandchildren in a stronger form, if possible, than he himself had them."

Dr. Bowditch adds: "I submit these facts and thoughts for candid, mature, and *practical consideration* and *use* in the treatment all are called to make of this terrible scourge of all parts of this Union. For my own part I fully believe that many patients now die from want of this open-air treatment. For years I have directed every phthisical patient to walk daily from three to six miles; *never* to stay all day at home unless a *violent storm* be raging. When they are in doubt about going out, owing to 'bad weather,' I direct them to '*solve the doubt*, not by staying in the house, *but by going out*.'"

More than thirty years ago a pioneer movement was made for the more rational treatment of consumption by Dr. Brehmer lately deceased. He established a sanatorium in Goerbersdorf where patients were treated by living as much as possible in the open air, by nutritious diet, and by exercise, all regulated carefully, and under the constant supervision of the physicians. Establishments in which the treatment has followed more or less closely in the line of that laid out by Dr. Brehmer have multiplied, but they are far from being as numerous as they deserve to be. The most celebrated of the other German sanatoria, is the one at Falkenstein on the Taunus Hills, under the management of Dr. Dettweiler, a former patient in the establishment of Dr. Brehmer, and afterward one of his assistants.

As to the value of the kind of treatment of consumptives which we should like to bring more prominently to the notice of our readers Dr. Dettweiler* gives his estimation of its value as follows, based upon his experience as patient and as physician:

If it is of interest or of value to hear the testimony of a physician who has lived for over fifteen years among phthisical patients, and who has suffered himself from the disease for even a longer period, but who is now so far cured that even with the most careful examinations bacilli cannot be found, I formulate my opinion as follows: Under appropriate treatment, if the disease has not made too much progress, and if the treatment is continued to a sufficient length of time, more than one-half of all cases of bacillary phthisis should be cured, and they will remain so if the patient will live accordingly afterward.

Dr. Meissen† in an able article entitled "Contributions to our Knowledge of Human Phthisis," speaking of the results obtained

*Dr. Kretzschmar in N. Y. Med. Jour., Feb. 18 1888.

†New York Medical Journal, February 18, 1888.

in 731 cases treated in Dettweiler's sanitarium at Falkenstein, gives the following statistical report:

The 731 cases were taken without selection from the records of the institution. They comprise 105 cases of initial pulmonary phthisis, 442 cases of active pulmonary phthisis, 125 cases of progressive pulmonary phthisis, six cases of florid pulmonary phthisis, fifty-two cases of stationary pulmonary phthisis, and of these, 483 patients were benefited by treatment, and 248 either died or did not improve. As we can hope for successful treatment in initial, active and stationary cases only, the others—florid and progressive phthisis—ought to be excluded from the list, and it would then appear that, of 600 patients with pulmonary phthisis, 483 were improved and 117 were not benefited by treatment, and while of all the patients, 66 per cent. improved and 33 per cent. did not, of those available for treatment 81.5 per cent. improved and 18.5 per cent. did not. Dr. Meissen says further: I have classified the result of treatment simply as "improved," for I do believe that in very few cases we can, after three months' treatment, speak of a positive cure. By 'improved' I mean not only a temporary disappearance of one or more of the unpleasant symptoms of the disease, or a slight improvement in the physical signs, but a decided and lasting gain in every particular, more especially an increase in the weight and in the strength of the patient, a stronger heart's action, and an increased capacity of the lungs, such as a careful and painstaking physician can observe during the duration of the treatment. In the cases reported the average duration of treatment was ninety days; but I should expect still better results if the patient could remain longer, although even then each case must be judged for itself. As an evidence that early treatment is of vital importance, it may be here stated that of 105 patients with initial phthisis 104 improved, and of 442 with active phthisis 334 improved and 108 did not.

The following description of a sanitarium for consumptives in the Adirondack Region, we quote at considerable length from a paper by Dr. Paul H. Kretzschmar*, Brooklyn, N. Y.

The interesting paper read by Dr. Alfred L. Loomis before the Medical Society of the State of New York, in 1879, on "The Adirondack Region as a Therapeutical Agent in the Treatment of Pulmonary Phthisis," and the very favorable results obtained personally by Dr. E. L. Trudeau, during a residence for over ten years in that portion of the Empire State, induced a number of benevolent ladies and gentlemen, under the lead and guide of Dr. Trudeau, to make an effort for the establishment there of an institution for the treatment of phthisical patients of limited means, and, in 1884, a moderately sized main building, two cottages (each of which accommodates two patients) and a stable were erected, and given the name "The Adirondack Cottage Sanitarium." Thanks to the philanthropy and the unselfish work of Dr. E. L. Trudeau, and to

*Medical News, LV., 259. 1889.

the kind support given to him by Dr. Alfred L. Loomis and others, this establishment has grown from year to year, and consists to-day of an enlarged main building—two wings having been added to the original—and eight fully equipped cottages, with three more almost completed, thereby offering facilities for over fifty patients. The feature which distinguishes this from other institutions of the same kind is the fact that the patients are not crowded together in one or two palatial houses, but that they live almost in the open air, in small cottages scattered over quite an area. These cottages are but one story high, elevated from the ground enough to prevent them from becoming damp, with a veranda in front and partly around each; they are supplied with running water and open fire-places. The smaller cottages are planned for two patients, the larger ones for four; the latest of these buildings all have a general sitting-room and a separate one for each patient. The partitions between the bed-rooms are of mason work, and reach to the ceiling, while those dividing the sitting-room from the sleeping department are only seven feet high, thus allowing free circulation of air throughout the whole building.

The location of the Sanitarium is a very pleasant one, about 1750 feet above tide-water, covering an area of over eight acres, about one mile from Saranac lake and seven miles from Paul Smith's; it is situated on a bluff commanding a grand mountain view toward the north and east, well protected from the prevailing eastern winds.

The drainage is simple and efficient. The earth closet system is wholly in use and the material is removed to a distance at frequent and regular intervals. All the water is derived from a spring half a mile distant and is brought through iron pipes to the Sanitarium, reaching the second floor of the main building by gravitation only. All the meals are taken together in the airy drawing-room in the main building; a large supply of pure milk is derived from the cows belonging to the institution, and patients are allowed to drink it *ad libitum* whenever they desire to do so, whether at meals or between them.

Three meals are served daily and the usual bill of fare is about as follows: Breakfast, at 7.30 A. M., consisting of oatmeal or hominy and milk, beefsteak, chops or bacon, potatoes, bread and butter, coffee or milk. Dinner at 1 P. M., soup, fish or fowl, or roast meat, two vegetables, pudding or fruit in season, milk *ad libitum*. Supper, 6.30 P. M., broiled meat or fish, or hashed meat, eggs, bread and butter, porridge, milk, fruit when obtainable. Alcoholic stimulants are very little used, and, contrary to the very pronounced view of all German observers, not at all in febrile cases. When the circulation is not readily excited and where no marked flushing follows their exhibition, they are moderately prescribed, usually in the form of whiskey or beer at meals. Patients are never allowed to use stimulants at their own discretion.

The climate of Saranac lake does not differ materially from that of other parts of the Adirondack wilderness, except that the temperature during the cold season is remarkably low and steady, almost all changes from December to April being below the freezing-point.

Much snow falls, and windless, cold, snowy days are a marked feature of the climate. January of this year was considered especially warm, the highest temperature recorded was 39° above and the lowest was 12° below zero. The rainfall is a little above the average for New York State, amounting to about 55 inches.

The prevailing winds are westerly and southerly, and very windy days are the exception. The lower the mercury falls the less wind there is usually and the dryer the air becomes, so that exceedingly low temperature, such as 20° below zero, is well borne by the patients. There is a dry period during the summer when little rain falls and the days become hot, while almost without an exception the nights are decidedly cool, and even during the hottest season there are but few nights when a blanket is not needed.

With the closest attention to hygienic matters, the main reliance in combating the disease is placed on the climatic influences and the life in the open air, this part of the treatment being carried out most thoroughly. Patients are encouraged to live out of doors and are gradually accustomed to inclemency of weather until they go out without regard to bad weather. Winter and summer they often sit—in winter thoroughly wrapped up—from six to eight hours in the open air. As the fever diminishes they are allowed to exercise, but not until then, and always moderately. The drug treatment is considered as secondary, but is used to meet indications.

The actual results obtained at the Adirondack Cottage Sanitarium are of very gratifying character, and compare favorably with those reported by others. A decided and important effect of treatment and climate is observed in the weight of most of the patients; the average gain for six months' stay at the institution is from nine to thirteen pounds. Perhaps the most remarkable effect has been observed in regard to one of the most frequent and dangerous complications of pulmonary consumption—hæmoptysis. Among eighty-three patients treated at the Sanitarium during the last year not a single hemorrhage occurred, and only four cases have been recorded since the institution began to receive patients four years ago.

Up to the end of 1888, 146 consumptive patients have been treated, and the results have been about as follows: Deaths 4 or not quite 3 per cent.; failed steadily 25, about 17 per cent.; stationary or slightly benfited 38, about 26 per cent.; disease arrested 63 or 43 per cent.; and cured 16 or 11 per cent.

The results of the last year are especially gratifying; of eighty-three patients, two, or 2½ per cent., have died; ten, or 12 per cent., continued to lose ground and returned to their homes; eight, or 10 per cent., have improved; sixteen, or 20 per cent., have been so restored as to be able to resume again their various occupations, and twelve, or 14½ per cent., have been cured. The success in curing over 14 per cent. of consumptives is remarkable, and speaks highly for the sanitarium treatment in general, and especially for that adopted at the Adirondack Cottage Sanitarium. Not to depend upon the patient's memory regarding important instructions, the following short, plain, and decided rules are placed in the hands of every inmate:

Out-of-door Life.—Patients gradually accustom themselves to leading an out-door life, that is, to remaining eight to ten hours in the open air each day. This should be done gradually, and at first the clothing should be heavy and the exposures to cold or inclement weather moderate in duration. Little by little the open-air sittings and walkings are to be increased until the entire day is spent out of doors in all kinds of weather. In stormy weather the sheltered side of the veranda should be used for walking or sitting. When feverish, patients are urged to go out and remain sitting on the verandas well wrapped in suitable clothing.

Exercise.—Violent exercise is injurious. When feverish, patients will do well to make as little exertion as possible. Fatigue, when induced in persons still having active disease, is sure to be followed by loss of appetite, fever, exhaustion, and even sweating. Severe exercise in hot weather is injurious and may be dangerous. Patients will be informed by the physician how much exercise their case requires.

Food.—If unable to eat at the regular meal hours, patients will do well to drink milk every four hours.

Expectoration.—Patients are required always to use the large spittoons in the public rooms and on the verandas, and the pasteboard ones in cottages; the latter should be burned every day in the stoves or fire-places. Expectorating in handkerchiefs or on the floors, or even on the grounds in the immediate vicinity of the buildings, is strictly prohibited.

It has been found that while moist sputum is harmless, when it becomes dried it will rise as dust, and may be inhaled. The above directions are given to guard against this result. Patients for their own welfare and in order to assist their rapid recovery, will strictly observe these rules, and will be liable to dismissal for wilful disobedience in this matter, which involves not only their own welfare but that of others.

Stimulants.—Stimulants are not allowed except under medical advice. No smoking is allowed at any time in the public rooms or on the piazzas. Patients are requested not to smoke at all unless permission is given by the physician.

The actual results obtained at the Saranac Lake Sanitarium place it in the front rank of institutions of similar character, but it stands before the world as unique, worthy of the highest praise, regarding its monetary affairs. Without endowment of any kind, depending simply upon the voluntary contributions of those interested in its work; strengthened and supported by the untiring labor of love of Dr. E. L. Trudeau and his associate, Dr. C. T. Wicker, of Saranac lake, the Sanitarium is a charitable institution of the highest and noblest type. The patients are by no means paupers, but the price for board and medical attendance is fixed at such a low figure, five dollars per week, that people of moderate means are thereby given a chance to enjoy the great benefits of this remarkable institution. The promoters and supporters of the Adirondack Cottage Sanitarium deserve the thanks not only of those who have directly been benefited by a stay there, but of everybody who can appreciate the excellent service done by it to suffering fellow-beings.

In an interesting paper read before one of the societies, and subsequently published, Dr. A. L. Loomis states his belief that the terebinthinate vapors in the evergreen forests possess healing proper-

ties for consumptives. He quotes the statement of Ringer that turpentine employed as a medicine enters the blood, and may be detected in the breath, the perspiration and in an altered form in the urine of the patient. The presence of the vapor of turpentine in the pine forests, Dr. Loomis remarks, cannot be doubted, and its "local and constitutional effects" he adds, "are those of a powerful germicide as well as stimulant." Dr. Loomis quotes the opinion of Mr. Kingsett that turpentine, during its oxidation, evolves the peroxide of hydrogen, and therefore by the "oxidation of the terebinthinates, there is produced in extensive pine forests an almost illimitable amount of peroxide of hydrogen, which renders the atmospheres of such forests antiseptic." He believes that the peroxide of hydrogen, so abundantly produced in pine forests "successfully arrests putrefactive processes and septic poisoning," and therefore he recommends residence in the pine forests as one of the most efficient means of relieving the symptoms of tuberculosis and retarding the progress of this fatal malady. At high altitudes, the coniferous or evergreen trees usually predominate, and if the views of Professor Loomis be substantiated by future investigations, it may be that the benefit believed to be obtained by consumptives at high elevations is partly due to the exhalations from these trees.*

THE INFECTIOUSNESS OF DIPHTHERIA.

Diphtheria is undoubtedly more frequently spread by direct contact than by indirect methods, yet that it is transportable upon the clothing of persons who have not had the disease there should be no doubt. The following few cases will serve to illustrate the ways in which the contagion is spread. Similar instances in our own experience will be found in the reports of the local boards of health and in former numbers of the Annual Report of this Board.

In a paper of the past year Dr. Jacobi† refers to a case in which a simple inflammation of the tonsils appeared to have had the diphtheritic inflammation engrafted upon it by the infection preserved two years in an old swab.

The case was at first tonsillitis, the result of exposure to cold. An abcess formed in one tonsil, and, after its rupture and discharge, the child had temporary relief. Up to this time there had been no particular systematic disturbance other than the tonsillar trouble would account for, nor were the voice and breathing affected any different from what would be expected in this disease. A day or so before the abcess broke, his mother thought swabbing the throat with alum water might give him relief, and she proceeded to do this, using a sponge swab that she had used in swabbing the throat in a case of

*Medical News, LVI., 161, 1890.

†Archives of Pediatrics VI., 131, 1889.

diphtheria in her family in Chicago two years ago. Two days after using this swab laryngeal stenosis began to show itself, together with a profound systematic disturbance characteristic of diphtheria, and death resulted in three or four days from septic absorption and obstruction to breathing.

Dr Downes* narrates the following history of indirect contagion:

Diphtheria had been brought from Halstead to a family at Goldhanger, in the neighborhood of which village no throat illness was then known. Two children were attacked at Goldhanger, of whom one died. On October 19th, their mother took some needle-work to an isolated farmhouse some two miles distant. On October 22d, two boys at the farmhouse sickened with diphtheria. One of them had been in the kitchen at the time of the needle-woman's visit, but had not spoken to her; the other was away at a day-school, a mile distant, in another direction. The needle-work was sent straight to the wash-tub, and the boys never touched it; but the brown paper in which it was wrapped was given, it was believed, to the two boys on the evening of the 19th, and was cut up by them into patterns for their amusement.

De Cresantignes states that in 1884 he was externe to l'Hopital des Enfants Malades in the service of Jules Simon. It was his duty to take notes, examine diphtheritic patients, and watch the cannulæ of tracheotomized cases. When he left the service each day he thoroughly washed his hands, and did not remember having ever soiled his clothes with the blood, mucus, or particles of pseudo-membrane, and at no time did he have symptoms of diphtheria. After the day's work he returned to the rooms occupied by his mother. The mother, without any other exposure, so far as could be ascertained, contracted diphtheria, of which she died. That the disease was conveyed by the garments worn and infected during the hours of service in the pavilion could not be doubted. An interne of l'Hopital de la Pitiè visited the child of one of the employès of the establishment, whom he found with diphtheria, for which he prescribed. He then returned to his father's house, a long distance, on foot, and embraced his parents and sister. On the following day the sister, who had not been exposed to any patient, complained of her throat, and the next day her tonsils were covered with the characteristic pseudo-membrane, and the cervical glands were slightly tumefied The brother, who had not changed his clothes after visiting the patient, was apparently the the medium of communication, although he himself was not affected with the disease.†

A study was made at Oullins by Prof. Bard of Lyons, in the latter part of 1888, for the purpose of learning in what ways the infectious germ of diphtheria is transported from person to person.

There were under observation twenty-nine cases, between the eighteenth of September and the end of November. The first case

*Trans. Epidemiological Society of London, VII., 209.

†An. Univ. Med. Sciences, Vol. I., J—18. 1889.

could not be traced to anything in the local surroundings of the village, and the conclusion was forced upon the investigator that it was to direct or mediate contagion which was imported into the place. Such conclusions coincide with the known resisting power of the diphtheritic germ, and the possibility of its prolonged preservation and transportation. Roux and Yersin have shown that the bacillus of Loeffler preserved its virulence after five or six months of culture, and clinical facts have shown that its virulence continued as long as four years. In twenty-six of the twenty-nine cases which were studied, the author was enabled to ascertain the subject who had been the bearer of the contagion, and in most cases could trace the day upon which the contagion was borne. In twenty-five cases there was direct contact between the bearer and the sufferer of contagion; in one the contagion was mediate. Of the twenty-five direct communications, ten were from brother to brother, three were among neighbors, and twelve at school. The remission of the epidemic followed the closing of the school. In only two of the secondary cases was the dangerous contact suspected, but not demonstrated. The first case developed six secondary ones; five of the latter were sterile, but the sixth developed another case, and the latter still another. The productive power of other cases has been carefully traced out, and the general conclusion may be drawn that in the development of epidemics of diphtheria, the disease is usually propagated from the persons of the sick to those of the well, usually by direct contagion.*

Lancery† tells us of an outbreak of diphtheria in a school which was undoubtedly started by a single diphtheritic pupil. Of seven pupils who came into pretty close contact with this child all took the disease, while of twelve who associated with her but little if any, all escaped. And yet the space in the school-room which separated the infectious child from the twelve that escaped, was only seven or eight feet, but her position was in a chair of her own near the fireplace and not on the benches common to the other scholars. On the strength of this Lancery argues that the infection of diphtheria does not have much power to diffuse itself through the air, a fact which, if determined to be true, will have a practical significance in the isolation of diphtheria patients. Many authorities believe that the diphtheritic virus has a high degree of power of adhering to articles and thus of becoming transported, but many would agree with Lancery that, if we can be assured against the carrying of the infection by the medium of persons and things, a separation with only a limited intervening space of air, not too confined and stagnant, would be sufficient to give a considerable degree of certainty against the spread

*Arch. of Pediatrics, VII, 318. 1890.

†De la Contagion de la Diphtherie, p. 61.

of the infection. Dumez* has also given a history, somewhat like that of Lancry's, of an outbreak of diphtheria in a school in which the boys and girls upon the same floor were separated by an open space only a few yards wide. Diphtheria prevailed among the girls, but did not affect the boys.

AS TO THE IDENTITY OF CROUP AND DIPHTHERIA.

The relation of croup and diphtheria was investigated by Lennander† by carefully finding out, whenever a case of croup came to his notice, whether cases of diphtheria had also occurred, either previously or subsequently, in the same house or in the neighborhood. In this way he was repeatedly able to connect a case of croup with a case of diphtheria. In all cases in which he tracheotomized for croup, and in which there was no deposit upon the pharynx, he was either able to demonstrate with positiveness a relation to diphtheria, or to show that it was highly probable. In the greater number of cases it was believed that secondary croup also depended upon diphtheria.

QUESTIONABLE CASES.

Dr. Downes in "Notes on Diphtheria,"‡ makes the following remarks on the confusion which exists in England in regard to the nosology (classification) of diphtheria, and what he says is as applicable to this side of the water as it is to the other:

The Registrar-General repeatedly notes and exemplifies the confusion which renders the diphtheria returns "very untrustworthy," save on the broadest scale and with the greatest care. Unfortunately, this chaos involves a very considerable amount of danger to the public health, as some examples taken quite at random from my journals may suffice to show.

Kate B——, a servant, sickened with diphtheria, then locally prevalent in a part of my district, was sent to her home, and died in a village fifteen miles away, also in my district. No diphtheria was then known for many miles around. Within a week, her child, at the same house—an inn—sickened and died also. The mother's death certificate was "diphtheritic croup," the child's "cynanche trachealis." I was aware of the whole matter at the onset, and warned the school authorities of the village. In reply the rector wrote: * * * "As to the disease, we are not very clear. Kate's was said first of all to be diphtheria, then croup, now diphtheritic croup. You evidently consider it infectious. The medical attend-

*An. Univ. Med. Sciences, Vol. I., J. 14, 1889.

†Arch. of Pediatrics, V., 694. 1888.

‡Trans. Epidemiological Society of London, VII., 195.

ant told the mother that the ch ld's complaint is not infectious, that she was not to be afraid. * * * I hope language is not used in any technical sense calculated to mislead the public mind."

Now, we had no more "diphtheria" in this village, but I will tell you what we did have—some "sore-throats"; and in the autumn came a fatal outbreak in the next village, followed early in next year, in the parish beyond, by the following succession of cases, the record of which I take from the Medical Relief and Death-Returns :—

February,	Eliz. B.,	aged 5	"Laryngitis,"	Fatal.
May,	Edith B.,	" 5	"	Fatal.
April,	Francis S.,	" 2	"Glandular swelling."	
May,	Ernest S.,	" 4	"Laryngitis,"	Fatal.
June,	Arthur R.,	" 5	"Sore-throat."	
July,	Emily W.,	" 8	"Diphtheria."	
August,	John W.,	"	"Tonsillitis."	
"	Mary W.,	"	"	
October,	Wm. M.,	" 1	"Laryngitis,"	Fatal.

Yet I was assured on medical authority that, with the exception of Emily W., there had been no diphtheria in this parish.

Again, one of the most fatal outbreaks I have ever witnessed was initiated by the school attendance of two diphtheric children. They had recently lost a little brother, but "only of croup," and their own swelled necks were merely "mumps," though mumps of a kind that left behind it nasal voice and impaired vision. And let me say by the way that very often indeed do I find diphtheria masquerading in this guise.

My able predecessor in office drew a distinction between diphtheria and what he described as "spreading-quinsy," but the medical attendant of cases regarded by Dr. Fox as spreading-quinsy tells me that paralysis subsequently followed in some of them. Again, the term "diphtheritic sore-throat" is becoming to the public as comfortable a euphemism as was, and to a great extent still is, scarlatina—a convenient excuse for shutting one's eyes to unpleasant responsibilities. Finally, a new candidate for popular favor has sprung up with an attractive title, which should become both popular and fashionable. I refer to the so-called "Sandringham sore-throat."

Now, I wish to emphasize my belief that, if we are to understand diphtheria aright, and to cope successfully with its spread, we must, in the first instance, bring ourselves to recognize, or at least to admit, its insidious and often trivial forms, and seek not to split up, but to unify our classification of its varieties.

So trustworthy an authority as Dr. J. Lewis Smith tells us:

Diphtheria will continue to spread and largely increase the aggregate of deaths until stringent measures be employed to prevent its propagation by mild walking cases. Children mildly affected with diphtheria, with little or no complaint of sore throat, are allowed to go abroad. They enter public conveyances, sit among other children in the schools or churches, are allowed to promenade the streets, and call upon their friends. I have in a number of instances seen children with diphtheria sitting among other children in the

clinics at Bellevue, and have in many instances traced the disease directly to the schools where one or more of the children had complained of sore throat. Recently, in a case of fatal diphtheria, an only child of about eight years contracted the disease apparently from embracing a playmate in the street who had been allowed to leave the house for the first time after an attack of diphtheria. I see no way to prevent the propagation of diphtheria by these mild cases, except by enforced stringent inspection and surveillance of children by parents, nurses, and teachers. During an epidemic of diphtheria, and wherever, as in most of the cities, diphtheria is established as an endemic, children who have the least sore throat should be excluded from the schools and be compelled to remain at home. In order, also, to adopt adequate protective measures, the fact should be recognized that third persons who have had no diphtheritic symptoms and infected apparel or furniture may be the medium of communication.*

FURTHER STUDIES OF THE INFECTIVE AGENT.

In last year's report we summarized briefly the studies of Loeffler, as well as those of Roux and Yersin and others, on the bacteriology of diphtheria. Since that report was written the results of much other work in the same direction have been published. When Loeffler made his first report† on the etiology of diphtheria, he did not claim that he had adduced strict proof that the bacillus which bears his name is the specific cause of diphtheria.

Several circumstances influenced him to take this conservative view of the matter. First, he had not succeeded in finding the bacillus in all of the cases of diphtheria examined; again, he had found a bacillus which he supposed to be the diphtheria bacillus in mouths or throats not affected with diphtheria; finally he had not succeeded in producing true diphtheritic paralysis in any of the animals inoculated with the bacillus.

Since this first report was made, Loeffler has resumed the same line of investigation and gives his latest results and conclusions in a paper just published.‡ In his later researches he has examined twenty-one typical diphtheria cases and the bacillus has not been missing in one. He found the bacillus in microscopic sections made through the diphtheritic exudate into the mucous membrane of the stomach of a child that had died of diphtheria, and also in the false membrane covering the site of a blister applied over the larynx in a

*An. Univ. Med. Sciences, Vol. I., J—18. 1889.

†Mittheilungen aus dem Kaiserl. Gesundheitsamte, II.

‡Deutsche Med. Woch XVI., 81. 1890.

case of diphtheria, and in two cases of diphtheria of the conjunctiva. From cultures made from a case of diphtheria seen early, before medical treatment was begun, almost a pure culture of the bacilli was obtained. At the time this paper was read, the bacilli derived from this source had been carried, for a period of twenty-seven months, through seventy-seven cultivations, and, though their virulence had been frequently tested, it was always found to be undiminished.

Referring to his first paper in the report of the Imperial Board of Health, and to the fact that in three instances he had found, in the mouths and throats of persons not affected with diphtheria, bacteria which at the time he supposed to be identical with the diphtheria bacillus, Loeffler is now convinced that he fell into the error which some other investigators have fallen into since then, of mistaking a pseudo-diphtheria bacillus for the true bacillus of diphtheria. He thinks that there may be several bacilli morphologically very similar, but distinguishable by important differences in the conditions favorable to their growth, and by the fact that the pseudo-bacilli are not virulent to the guinea-pig. In numerous examinations of the secretions from the mouth and throat of well persons, and persons with other diseases of the throat than diphtheria, he has never again succeeded in finding the bacillus.

In his later work Loeffler has succeeded, as some other investigators have, in producing an apparently real diphtheritic paralysis of animals as a sequel of the infection by inoculation.

After the inoculation of guinea-pigs with the bacilli of diphtheria, notwithstanding the grave changes found in the kidneys and in the pleural cavity, the bacilli are never discoverable in the internal organs. Loeffler therefore reasons that the bacillus in its localized growth must produce a poison very deleterious in its action, especially upon the blood vessels. He therefore sought to isolate this poison and succeeded in doing so. He found that the poison was of the nature of an enzyme, and that the older the culture the more of the poison it contained. Injected into animals, it produced symptoms identical or similar to those produced by the inoculation of the bacilli, and in dogs it often caused paralysis in those animals that survived. Rats and mice, which show an immunity against the bacilli, were also immune against the isolated poisonous principle. Sunlight and the free exposure to the air diminished the virulence of the poison.

As to the duration of the life of the diphtheria bacillus, Loeffler found that when dried on silken threads in the dessicator, the bacilli grew very luxuriantly after thirty days; after forty-eight days, the number of the colonies was somewhat diminished, and after sixty, seventy-one, and 101 days a few colonies still developed. He was not able to test the duration of their vitality longer on account of using up his stock of threads.

During the past year Roux and Yersin have continued their studies and have concluded that the poison secreted by the diphtheria bacillus resembles diastase in several of its properties. The diphtheritic poison, so potent when it is introduced under the skin, may be taken by the mouth, in large quantities by guinea pigs and pigeons without much apparent inconvenience to them. Having shown the numerous points of similarity between the diphtheritic poison and the diastases and venoms, Roux and Yersin remarked that the extreme toxicity of the poison secreted by the bacillus might lead one to regard the bacillus itself as very virulent, but that, as a matter of fact, the contrary is true. The toxicity of a culture fluid does not express the virulence of its microbe. The energetic toxic power of the diphtheritic poison, which even in very small doses and after it has been kept a long time produces the most terrible results, makes it imperative that the physician should interfere at the beginning of the formation of the false membrane, and before sufficient time has elapsed for the bacillus to secrete a sufficient quantity of poison to do its fatal work, for in diphtheria, contrary to that which occurs in many infectious diseases, infection is not produced by the invasion of the microbe into the tissues, but by diffusion into the entire organism of a poison secreted upon a mucous membrane which may be only slightly eroded.*

Dr. Escherich† has communicated a preliminary report of studies as to the cause of diphtheria. He investigated twenty-two cases of epidemic diphtheria of various grades of severity to determine the character of the bacteria present in the secretions of the mucous membranes and in the false membrane. His method of precedure was merely to touch the end of a sterilized platinum wire to the affected membrane, or to lightly bore it into the false membrane, and then to transfer to the culture media the almost invisibly small quantity of matter adhering to the end of the platinum needle. The colo-

*Arch. of Pediatrics, VII., 315. 1890.

†Centr. fur Bakteriologie und Parasitenkunde, VII., 8, 1890.

nies which developed within twenty-four hours were sometimes found to consist of pure cultures of the Loeffler bacillus (bacillus of diphtheria). In many other cases, however, other bacteria developed within the second twenty-four hours. The diphtheria bacillus was inoculated upon animals, and with guinea-pigs, one and a half cubic centimeters of a twenty-four-hour bouillon culture sufficed to cause death within from twenty-four to forty-eight hours. Young dogs were found to be very susceptible to even small quantities of the culture. Injected under the skin, they died from it in from two to three days, with enormous hæmorrhagic œdema. Inoculated in the windpipe, false membrane was formed, accompanied with croup-like difficulty of breathing, and death in most of the cases.

In the twenty-two cases of diphtheria, the bacillus of Loeffler was found after the first inoculation in nineteen, and after the second trial in the twentieth case. In the two cases where negative results were obtained only a single test was made in each. In one of these, it was a case of so-called chronic diphtheria. In the twenty cases in which the bacillus was found, it was tested upon animals in fourteen cases, and its virulence was shown in all. In two cases of throat diphtheria which ended in recovery, fresh cultures were made every second day until complete recovery, and the virulence of the bacillus was found not to diminish in the least as convalescence set in, neither was there any difference in the virulence of the bacillus derived from severe or mild cases of diphtheria.

As "control" experiments, he examined a series of cases of sore throat accompanied with fever, a part of which had small fibrinous exudations in the crypts of the tonsils. In none of these was the bacillus of Loeffler found. The author considers, however, as the most convincing "control," the results of the every-two-day examinations of cases until complete recovery and afterward. He brought out the fact that the bacillus may persist in the throat from one to three days after all false membrane has disappeared, and he asks the question whether it may not be possible to have a diphtheria without false membrane, as it is to have a scarlet fever without rash.

Zarniko* making use of the material from the medical clinic of Kiel, found the Klebs-Löffler bacillus in eighteen out of twenty cases of diphtheria. In artificial cultures the bacillus grew at temperatures between 66° F. and 107.6° F.; most readily at from 91° F. to 98.6° F. It was found that a temperature of 140° F. maintained

*Centr. fur Bak. u. Par. VI., 227. 1889.

for ten minutes, destroyed the bacillus. He could in no case make out the presence of spores. Zarniko also examined eleven throats affected with non-diphtheritic inflammations A large number of colonies were examined, but in no case was the diphtheria bacillus found. He examined also the mucous membranes of eighteen throats in persons with various diseases, with the same negative results. On the other hand, in a case of rheumatism, he found a bacillus probably identical with Loeffler's pseudo-diphtheria bacillus but differing from the diphtheria bacillus in that it was not virulent to guinea-pigs, as well as in other respects.

PREVENTIVE MEASURES.

In Boston where diphtheria has been quite prevalent of late years, the opinion has been expressed by the municipal board more than once that the prevalence of the disease in that city is due in large part to mild and often unrecognized cases of diphtheria. In his report for the year 1889, Dr. Durgin, chairman of the board says:

In order to effectually deal with an epidemic of diphtheria, the following things are absolutely necessary: First, a good hospital, this the city has; second, what might be termed a house of refuge, where all who had been exposed to the disease might be placed for a reasonable time; third, a building in which convalescents could be placed during the process of disinfection of their houses; fourth, a careful medical supervision of the schools, for it is an undisputed fact that many children attend school while they are suffering from the disease in a mild form, and communicate diphtheria to other children; fifth, power to remove these cases in tenement houses, not only the legal power, but also that which is of fully as great importance, the moral support of the community; sixth, the prompt report of cases, not only of diphtheria, but also of membraneous croup, which is conceded by the best medical authorities of the present day to be the same as diphtheria; seventh, the prohibition of public funerals in cases of diphtheria. The report of cases is evaded in many ways by using the term "laryngitis," and various other terms, which, if not absolutely incorrect, serve to mislead, not only the friends of the patient, but also the general public.

* * * In regard to the removal of patients, it is neither desirable or important to send all indiscriminately to a hospital, for in many instances the patient can be isolated at home, or the other members of the family can be sent to some institution under the control of the board of health. A patient can be perfectly isolated in a house occupied by only one family. Isolation is also comparatively easy in one of the modern apartment houses, but in the ordinary dwelling-house, occupied by two or more families, isolation is practically impossible. The history of the course of diphtheria the past two years demonstrates this.

NEED OF REST AFTER DIPHTHERIA.

It is generally understood by intelligent people that diphtheria is a treacherous disease, but if the importance of rest and the wisdom of prolonging the period of convalescence were generally acknowledged, many lives might be saved that are now lost, sometimes several weeks after the patient is thought to have recovered. Dr. Earl* of Chicago has spoken as follows in regard to this subject:

It is probable that a larger number of sudden and unexpected deaths take place after diphtheria than follows any other disease. And yet we are acquainted with medical men who do not believe it worth while to isolate those sick with this malady, and think their responsibility ceases when the white spots commence to disappear in the throat. The following is a hypothetical case, but is there a gentleman present who has not seen one or more which corresponds with it?

A. B. C., aged six years, was taken with a mild attack of diphtheria, which yielded easily to treatment in five days. The spots on the tonsils had nearly disappeared, and I discontinued my visits. Ten days after, I was hastily summoned, and, upon my arrival, found the child dead. The parents informed me that the little one had made an excellent recovery from the diphtheria, and, although somewhat weak and easily tired, had been playing around the house. "A short time before we summoned you, we noticed that the little one was quite pale, and complained of a little pain around her heart. She perspired freely, however, and we thought nothing of the pallor; but her limbs began to get blue and her breath short, and so we sent for you."

Not all cases are as pronounced and sudden as the one narrated but death comes. Sometimes we have premonitory symptoms, if we will note them, and if we will take any sort of notice, death may be averted in some cases. I have recently ordered a young woman to maintain the horizontal position for ten weeks and during some of this time her heart was so irregular and weak that its pulsations could not be counted. I saw a case recently in consultation with my colleague, Professor Quine, simply to add my testimony to his, that the only safety to a young girl who had passed through a mild diphtheria was in bed. Her heart was slow and weak, and the extremities were a little subnormal as regards temperature. The people were amazed when I told them that the child should be kept in bed for at least four weeks, and possibly a longer period.

Two months ago I saw a case, in consultation, in one of our suburban towns (we have no suburbs now, we have taken them all in). An adult had only a moderate pharyngeal diphtheria, but his lungs were involved, probably a catarrhal pneumonia (secondary). He was very weak, but his recovery could be looked for, although a long time must elapse before he could resume work as a bank clerk. His

*Archives of Pediatrics, VI., 879. 1889.

attending physician had given him excellent advice, but everybody was clamoring for a speedy cure. It is sometimes very difficult to make the people understand the necessity of carrying out details, particularly those which the profession have not grasped and fully realized. Notwithstanding that this young man was kept in the lying position, fed with food whose assimilation was made as easy as possible, nourished by rectum and under his skin, life maintained by general, cerebral and cardiac tonics and diffusable stimulants, notwithstanding all this he died. In some families, where they are willing to go to the trouble, I am in the habit of keeping all diphtheritic patients in bed two or three weeks after all symptoms subside. This may not be necessary, but it is safe. It is absolutely demanded, however, where symptoms of paralysis are present, and should be insisted upon till every sign denoting it has disappeared.

TYPHOID FEVER.

In this department of the Fourth Annual Report an explanation was given of the two principal theories that prevail in regard to the causation of typhoid fever. In accordance with one, the "water theory," infection occurs, at least in the great majority of cases, through the medium of drinking water. The views held for sometime by most of the American and English physicians have been in accordance with this theory. The other, the "ground theory," elaborated and ably upheld by Pettenkofer of Munich, has, until recently, met the approval of the majority of Continental medical and sanitary authorities. This class has held that the typhoid fever germ, dejected from the fever patient, is not at first infectious, but must needs reach the earth for its development, subsequently rising into the atmosphere and infecting when inhaled. As the believers in the Pettenkofer theory have denied the transmissibility of the typhoid infection through the medium of drinking water, so now, perhaps, some of the adherents of the water theory go too far in dogmatically asserting that typhoid fever is never communicated through the medium of the atmosphere, though we are not so certain that the ends of public hygiene might not be all the better served by this exclusive doctrine, since we believe that the general public needs especially to have strengthened its hold on the idea that polluted water is by far the most frequent source of typhoid infection, even water that to the senses appears all right. Late scientific studies into the causation of typhoid fever have, on the one hand, served to support and confirm the results of practical observations as to the

water origin of the disease, and, on the other hand, have given a modicum of consolation to the ground theory in a modified form. For a summary of some of the most important work in this field, the reader is referred to the following pages:

POLLUTED WATER AND TYPHOID FEVER.

The experience in Paris during the last few years in the use of polluted water, is interesting and instructive. The ordinary supply of the city for drinking purposes is of good quality, but during the dry seasons it is insufficient, therefore it is sometimes found necessary to resort temporarily to the use of river wa er. When this is unavoidable, with a fine sense of justice, the water department turns the river water, drawn from the Seine, first on one arrondissement for a while and then on another, but giving no notice when the bad water is coming. Vallin,* in a recent communication, has given further information as to the results of this practice.

In 1887. Chantemesse and Widal demonstrated that the distribution of the water of the Seine in Paris gave rise, three or four weeks after the beginning of the distribution, to an increased number of cases of typhoid fever in those districts of the city in which the river water was turned on. To show that the excess in the typhoid prevalence was not due to seasonal influences, these writers call attention to the fact that the same excessive prevalence followed the turning on of the polluted water in January 1887, on account of the breaking of the main of the drinking water supply.

In 1888 M. Chantemesse continued his researches in the same direction and also in 1889. In 1888 the abundance of rain prevented the necessity of a resort to the river water and typhoid fever that year was more rare than it had been for thirty years before.

In 1889 it was otherwise; from May 25th to June 19th the water of the Seine was distributed in place of the spring wa er to the 13th, 14th, 16th, and 9th wards, comprising a population in the neighborhood of 500,000 inhabitants. The admission of typhoid fever cases into the Parisian hospitals vacillated before the change between fifteen and thirty cases a week. These figures augmented very lightly but regularly during all of the month of June and reached the number of forty admissions per week by June 16th. But after this period of infection and incubation it is seen that the numbers rapidly increased. From July 7th to the 13th there were 73 admissions, then 53, 127, 100, 120, 129, 73, for the weeks ending with August 24th.

Thus it is seen the curious coincidence of 1887 was reproduced, and it would have been still more marked if, to the complete and typical cases of typhoid fever, were added the cases of febrile

*Revue D'Hygiene, XI., 1049, Dec. 1889.

derangement of the stomach (*d'embarras gastrique febrile*), which Chantemesse considers, with Kelsch and Kiener, as cases of abortive typhoid fever, and of which the prevalence was much greater in the ward where the river water was distributed.

Dr. Schneider* gives some interesting facts in regard to the use of river water in 1889 upon the troops in the Parisian garrison. When it has been found necessary to substitute the river water in the place of the usual good supply, the consequences have invariably been the same as those suffered by the civil population from the same cause. For example:

In the Penthièvre Barrack, there were no cases of typhoid fever in June, there were two in July, and one in August. From August 13th to September 2d the water of the Seine was turned on in the place of that from the Vanne. Then twenty-one cases in September.

In the Barrack of Chateau d' Eau, there had been no cases in May and June. The river water was put on from June 15th to July 3d. Then fifteen cases in July and August.

In the Reuilly Barrack, only five cases in the first six months of 1889. River water turned on from July 4th to the 23d. Result, ten cases in July and August.

In all the barracks of Paris, there were only ten cases of typhoid fever in October. From the 31st of this month to November 5th the river water is put on. From the 1st to the 21st of November there were only fourteen cases, but in three weeks from the time the water was changed, there was a serious outbreak. From November 22d to the 30th, there were thirty-four cases, and forty-one from December 1st to the 12th.

Another remarkable fact incriminating the river water is that six barracks, which did not receive the river water from October 31st to November 5th, had only a single case from November 22d to December 12th.

The city of Vienna was furnished with a good and pure supply of drinking water in 1874, taken from elevated springs at a distance from the city. After this new supply had been put into the houses pretty generally, there was a marked diminution in the rate of prevalence of typhoid fever, so much so, that of late years the professors in the General Hospital have remarked that a case of typhoid fever in the institution had become something of a rarity. A final and convincing proof that the change in the water supply was the cause of the change in the typhoid prevalence was furnished by an epidemic in 1877, which followed the partial substitution of the river water for the spring water in certain quarters. The epidemic was located in the districts provided with the Danube water.

*Revue D'Hygiene XII., 25. 1890.

The number of patients in this quarter was at the rate of 21.5 while in those provided with water from the spring it was 3.8.*

In the latter part of the summer of 1885, an outbreak of typhoid fever of considerable magnitude occurred among the troops of the German city of Altona, a suburb of Hamburg, and lying just below the larger city on the river Elbe. Pfuhl, who investigated the outbreak, came to the conclusion that the men received the infection while bathing. The bathing establishment is situated on the river and the water is grossly polluted. He thinks that in diving or in some other way some of the river water was accidentally swallowed, giving rise to the infection. When the bathing was stopped the outbreak ceased forthwith.†

The danger from water contaminated with the stools of typhoid fever patients was well shown on the Ohio river in 1887. From Bellaire, to near the mouth of the Ohio river, a distance of nearly 800 miles, almost every town obtaining its water supply from the river was more or less affected with typhoid fever. Drs. Rushford and Cameron of the Bacteriological Laboratory of the Medical College of Ohio, demonstrated before the Cincinnati Academy of Medicine the bacilli of typhoid fever in the water of the river.‡

Dr. Cyrus Edson§ thinks that typhoid fever is never communicated through the medium of the atmosphere, that it never originates *de novo*, and that the causes of the spreading of the disease are, in the order of their frequency, infected water, infected milk, infected ice, digital transportation, and infected meat, and believes that, "if in every case of typhoid fever the stools and the bedding were effectually disinfected, and the person of the patient after convalescence was also disinfected, typhoid fever would soon cease to exist."

Brouardel, as quoted by Dr. Theobald Smith, says:

Experience has taught us that it is the large cities which perpetuate the epidemics of typhoid fever and from which the transmissions of this disease radiate. It may be burdensome to obtain pure water and distribute it to a community, but it is possible. Has it not been said repeatedly that nothing costs so dearly as an epidemic? Is it not true that a malady which kills one or two thousand persons every year strikes, from an economic point of view, a population more cruelly than the taxes, which might have spared the lives of several thousand from fifteen to twenty-five years old, cut down at an age at which they have cost so much and returned so little to their State? If we share these views, we should

*An. Univ. Med. Sciences, Vol. I., H-14. 1889.

†Uffelmann's Supplement, VI., 187. (1888.)

‡Dr. Johnson in Brooklyn Medical Journal, IV., 210. 1890.

§New York Medical Record, XXXV., 9. 1889.

make an energetic effort in every country, proclaim the good fight, the preservation of human life. Our proofs are sufficient. The authorities need only to be convinced.

Uffelmann cites an instance in which Pettenkofer's theory of the ground origin of typhoid fever would apparently not hold. An outbreak of typhoid fever occurred among the soldiers in the barracks of Oschatv. The building rested upon an impervious rock covered with an impervious stratum of clay. Further safety was secured by a layer of cement beneath the building. The water supply was derived from a brook which passed through three villages before it reached the barracks. Typhoid fever first appeared in these villages and the dejec ions of the patients were thrown out upon manure heaps or upon the overhanging bank of the brook, where the rain must have washed the infection into the water course. Later the disease broke out in the barracks. An importation from the villages could be excluded as well as from the city, for in the latter place there had been only one case of typhoid fever securely isolated in the poor-house.*

DIGITAL TRANSMISSION OF TYPHOID FEVER.

Dr. Roberts Bartholow† of the Jefferson Medical College, Philadelphia, referring to the subject of the digital transmission of typhoid infection, says:

"The unfortunate results of ignorance are well exhibited in some of the modes in which disease germs get into human food. Nurses, attendants and families of the sick, having no knowledge of the subject and of uncleanly habits, will carry under the finger nails, or in the crevices of the skin, disease germs and spores which may be attached to bread or other foods used by a household. Such large bodies relatively as the ova of the tapeworm have been thus conveyed, self-infection may thus occur, and general infection of a community may have its original source in the same way with entire facility."

THE TYPHOID BACILLUS IN THE SOIL, FILTH, ETC.

Uffelmann‡ refers to the practical importance of the question whether the infection of typhoid fever can retain its vitality for any great length of time in masses of decomposing filth such as are found in privy vaults, manure heaps, and other places where it is often

*Wiener Med. Presse, XXIX., 1354.

†Twelfth An. Rpt. State Bd. of Health of Wis., 141.

‡Centralblatt für Bak. u. Par. V., 497. 1889.

thrown, and he cites several personal observations which make it evident that it can for weeks, and even months, and perhaps for years retain its virulent qualities. He relates that in the earlier years, of his practice he observed a localized outbreak of typhoid fever in a small village in which three laborers all, nearly at the same time, came down with typhoid fever. A little later a few single cases occurred in the same houses. These three laborers had, about six days before their sickness, removed and hauled away a manure heap upon which, one year before, the discharges from the bowels of two typhoid fever patients were emptied without disinfection, and upon which, since then, the excrement of men and animals had been thrown. In the meantime there had been no other cases of typhoid fever in the village.

He also relates that he saw in 1875 two cases of typhoid fever in which sickness began about a week after the persons had been engaged in cleaning out a privy vault into which, twelve weeks before, the dejections from a typhoid fever patient had been thrown without disinfection. In this place also there had been no intervening cases of typhoid fever.

Uffelmann refers also to a case of Finkler's in which typhoid fever followed the removing of a manure heap into which, nine months before, a portion of a mattress badly soiled with typhoid dejections had been thrown.

Dr. Chour,* a Russian military surgeon, tells about two regiments of infantry stationed at Jitomir and receiving the same water supply suffering unequally from typhoid fever. One regiment, the 127th, furnished a sickness-rate of 9.6 per 1,000 in 1885, and of 3.2 per 1,000 in 1886. The other, the regiment of Kourk, presented, during the same period, a sickness-rate from typhoid fever much more elevated, particularly among the men lodged in the Hemmermann Barrack. In this barrack the sickness-rate from typhoid was as high as 50 per 1,000, and even 155 per 1,000 in one of the companies. The head of the medical department of that corps ordered the evacuation of the rooms occupied by the fourth company and the energetic disinfection, not only of the walls and the floors, but also of the clothing and bedding. These were submitted to steam disinfection, the floors were taken up, the spaces beneath them were saturated with the five per cent. solution of carbolic acid, and, finally all the wood-work was repainted. After the execution of these radical measures, the fourth company re-occupied its rooms and its sickness-rate from typhoid was reduced to 1.7 per 1,000 in 1887, and to 0 in 1888.

*Revue D'Hygiene, XII., 72. 1890.

Meanwhile in the rooms of this barrack which had not been submitted to disinfection, the prevalence of typhoid fever persisted and gave a sickness-rate of 22 per 1,000 in 1887, and of 33 in 1888.

At this epoch the dust from the floor and from the space beneath the floor was submitted to a bacteriological examination and was found to be exceedingly rich, 14,000,000 in each gramme, and among others, the presence of the typhoid bacillus was demonstrated. The infectious rooms were then quickly evacuated and the men were camped in the neighboring woods. Three cases appeared within the period of incubation and after this there was a complete cessation of the prevalence of the disease.

The discovery of the bacillus of typhoid fever in the dust of floors and sub-floor spaces is not an isolated fact. Tryde and Salomonsen in 1884 discovered the typhoid bacillus, not only in the soil, but also beneath the floors of the barracks of Copenhagen where typhoid fever had been prevalent. Utpodel at Augsburg, Birch-Hirschfeld in Leipzig have also found the bacillus under similar circumstances.

Dr. E. W. Perry of Stetson communicates the following histories of cases of typhoid fever, two of which were supposed to have received the infection from an old privy vault, and the third from the rubbish of an ancient building.

A. B., thirty-eight years old, a carpenter, and C. D., a young man, his apprentice, were at work repairing buildings, and during the work it became necessary to tear down and move a portion of an old building in which was situated the privy vault. These two men did this work on a very hot, sultry day. The smell of the old vault was horrible, but they persevered, and raised and put the new part in proper shape. In less than three weeks the young man came down with typhoid fever and had a long, but not very severe, run of sickness, finally recovering. A. B. sickened later with typhoid fever in a severe form and died after two and a half weeks' sickness. A. B. was the older, stronger and more active of the two and did more of the shoveling, and sweat profusely while at his work.

E. F., a carpenter was engaged in tearing down and rebuilding some very old and filthy buildings, and, in a short time after, became sick, and for six weeks or more had a "slow fever," so-called, then gradually recovered. I believe it was a case of mild typhoid, and I now recall that he complained of the bad smell he was forced to work in while on these old buildings

Uffelmann* studied the life of the typhoid bacillus by mixing a pure culture of this micro-organism with earth taken from the superficial layer of garden soil which had been dried in the sun. Polluting the mixture with fluid and solid excreta and triturating the mass in a mortar, the mixture was sprinkled at intervals with rain water and kept at varying temperatures from 32° to 73.4° F. Once every

*Centralblatt für Bak. und Par. V., 502. 1889.

month samples from it were examined bacteriologically for the typhoid bacillus, and every sample contained quite a high number of the bacilli, and at the time this communication was made, at the end of five and a half months, there had been some increase in the plentifulness of the typhoid bacilli.

The same author investigated the fate of the typhoid bacillus in fecal masses, as in privy vaults. Observation has shown that the common putrefaction bacteria rapidly destroy some disease producing bacteria, but Uffelmann's observations do not show that this is true as regards the typhoid bacillus. In some of his experiments the life of the bacillus, when kept at temperatures between 62.6° and 72.5° F., in mixtures of solid and liquid excreta, was preserved 121 days, and when kept at a temperature below 44° F., the bacillus retained its vitality from 66 to 116 days. There was apparently no difference in the action upon the bacteria whether the excreta was fresh or was a portion of the old contents of a privy vault.

Uffelmann also studied the life of the bacillus of cholera under similar conditions and found that it was much more brief, extending to not more than three or four days at most.

Grancher and Deschamps* investigated the power of the typhoid bacillus to penetrate the soil of irrigation fields. Their principal conclusions are, that it does not ordinarily descend farther than forty or fifty cm. (sixteen or twenty inches); that at this depth (sixteen to twenty inches) it retains its vitality a long while without being destroyed by the other bacteria in the soil; that it does not penetrate into the substance of vegetables grown in the soil.

Twenty-two samples of earth, sand, and dirt were examined by Holz† for the typhoid bacilli, including sand swept from the floors of rooms where there were cases of typhoid fever, dirt from between and beneath the flooring of rooms where there were cases of typhoid fever, and earth from walks, play-grounds, gardens, etc., but in none of these was the bacillus of typhoid fever found. He found, however, in quite a large number of these samples, as well as in samples of water, a bacillus resembling somewhat the specific germ of typhoid fever but differentiated from it with certainty.

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*Giornale della Reale Soc. Ital. D'Igiene, XI., 651. 1889.

†Zeitschrift für Hygiene, VIII., 143. 1890.

FURTHER STUDIES OF THE BACILLUS OF TYPHOID FEVER.

Vilchur* of St. Petersburg, made a series of studies covering a period of two years, as to the etiology and clinical bacteriology of typhoid fever. In the examination of twenty-eight cases he found that the specific bacillus never appeared in the dejections before the tenth day, but that after that it is almost constantly to be recognized. As to their number, they are never numerous, usually not more than one to twenty-five or thirty of other bacteria found in the intestines. He could discover no relation between the severity of the disease and the number of bacilli present.

In thirty-five cases the blood was examined microscopically, as well as by cultures, but the bacillus of Eberth was found but once, and it is interesting to note that this was on the eighth day of the disease, and that examination of the stools on the same day gave only negative results. On the other hand, the bacillus was absent from the blood on the fourteenth day, but present in the stools. The blood for examination was not taken from a rose-spot, but from the skin of the arm. Vilchur inoculated sixteen rabbits in various ways, but in none were anatomical changes produced which he thought to be characteristic of typhoid fever.

In the cases of typhoid fever examined by Karlinski† the bacillus was found in the fæces in all, but in none before the ninth day, and in the largest number of cases, not before the fourteenth day of sickness. Agreeing with other observers, he found the number of typhoid bacilli small as compared with the other micro-organisms in the stools. With the sinking of the temperature and the disappearance of the diarrhœa, the bacilli rapidly disappear. In twenty-eight cases, the bacillus could be found in none later than the twenty-third day. In one single case that suffered a relapse, the bacillus, after its complete disappearance, reappeared on the fiftieth day.

The stools received and kept in sterilized jars at various temperatures from 46.4° to 89.6° F., did not preserve the typhoid bacillus longer than three months. While the number of typhoid bacilli never in but two cases, exceeded 100 per cubic centimeter in the fresh stool. In some, after standing some time, the number of typhoid bacilli had increased to 1,800 colonies for each cubic centi-

*Centr. fur Bak. u. Par. VII., 280 1890.
†Centr. f. Bak. u. Par. VI., 65. 1889.

meter. The absence or presence of certain other bacteria had a great influence upon the life of the typhoid bacillus.

The typhoid bacilli in stools, added to the liquid drainage from a privy, were found to have entirely disappeared within forty-eight hours, although many plate cultures were examined. The sewage, before the addition of the specific bacilli, contained 1,500,000 bacteria and had a slight acid reaction. Some of the same sewage, sterilized, preserved the typhoid bacilli a month, though not in large numbers.

Mixed with a portion of the contents of a privy vault, alkaline in reaction, the bacilli diminished in numbers and disappeared in forty-five days.

Mixed with river water in a large flask and kept at a temperature of from 52.7° to 61.7° F., their numbers gradually diminished and none could be found after ninety-six hours. In cistern water at 57° F., they had disappeared in seventy-two hours.

In other experiments with a mixture of typhoid excreta and normal stool, the bacillus was preserved more than one hundred days.

Typhoid stools mixed with sterilized garden earth, preserved the bacilli at least three months at variable temperatures, although the earth had become entirely dry. Mixed in the same way with earth but sprinkled with rain water every five days, the baccilli endured only thirty-one days; in river mud, only three weeks; in dried typhoid stool, over one month.

Karlinski at the suggestion of Pettenkofer sought to determine the fate of the typhoid bacillus when added to well water. He made use of a well in the yard of the Hygienic Institute in Munich, by adding a sufficient quantity of the bacilli to the water and making daily plate cultures with quantities of the water.

The water of the well, before the addition of typhoid bacilli, contained from 730 to 1,120 bacteria of from five to eight different kinds. Five litres of bouillon, of which one cubic centimeter contained seventy-two million of typhoid bacilli, were added to the water. Two hours later one cubic centimeter of the water was found to contain 500,000 typhoid germs; on the next day 130,000; on the third day 18,000; fourth day 9,400; seventh day 200; eleventh day five; and on the fourteenth day the water had returned to the same condition as before the experiment. The water of the well was stirred up each time before the sample was taken.

As this report is going through the press, a communication comes to hand giving the results of some experimental studies on the typhoid bacillus made by Holtz* in the Hygienic Institute at Greifswald, at the suggestion of Professor Loeffler. By the use of a potato gelatin with the addition of a slight quantity of carbolic acid, he has apparently an advantageous method of excluding colonies of unsought for bacteria and of recognizing the bacillus of typhoid fever. Holz shows that the life of this bacillus in water is longer than is admitted by most observers. In well water inoculated with typhoid bacilli, these germs could be demonstrated with certainty as late as the eighteenth day, and in the highly polluted water of a drain similarly inoculated the bacilli were found as late as the fourteenth day.

Dr. W. Hesse† has tested a great variety of food stuffs, cooked and uncooked, as they are found in the kitchen, to determine their suitability as culture media for the bacteria of typhoid fever and cholera. After sterilization they were inoculated with the germs of these diseases, each species of bacterium in reagent glasses by itself. Testing the contents of the glasses four or five weeks after inoculation, he found that the specific bacteria were alive in by far the greater number. Thirty food substances were used, and among them the typhoid fever bacilli had died out in only hydrant water, string beans, cow's milk cheese, and mushrooms. The cholera bacilli did not do so well, having died out in nine substances. These results show that nearly all of the substances tested are good media for the growth of the bacilli of typhoid fever and cholera.

DO ANIMALS HAVE TYPHOID FEVER?

Dr. Roberts‡ has published an interesting account of what he believes to have been an epizoötic of typhoid fever among the dogs of a town in India. In a large number of post-mortem examinations of dogs, victims of the disease, he found a combination of the following lesions: spleen increased in size, mesenteric glands inflamed and enlarged, large oval ulcers in the ileum, enlargement of Peyer's patches, points of submucous hæmorrhage, etc. These dogs had suffered a continued fever, diarrhœa, and other characteristic symptoms of typhoid fever. Dr. Roberts believes that if future observations

*Zeitschrift für Hygiene, VIII., 143. 1890.

†Zeitschrift für Hygiene, V., 527. 1889.

‡La Salute Pubblica II, 280. 1889. From Indian Medical Gazette.

confirm the truth of his conclusions, that dogs may have typhoid fever, this fact may help to explain the continued prevalence of the disease in some places.

Dr. Serres had already noted the existence of typhoid fever among monkeys, dogs and cats, and subsequently had an opportunity to observe an outbreak of typhoid fever among the monkeys of the Museum of Natural Sciences in Paris.*

Dr. Rackford† of the Medical College of Ohio experimented upon rabbits by pouring cultures of the typhoid bacillus into the stomach after an intra-peritoneal injection of morphia had been given, and a dose of bicarbonate of soda by the stomach. Though the production of this disease was not the object of the investigation, the experimenter believes that one animal died of typhoid fever. This animal remained well for a few days, and then had increased temperature and diarrhœa. Death followed on the thirteenth day after the inoculation. "Peyer's glands throughout the ileum projected normally above the surface of the mucous membrane, and were much injected; one patch, about six inches from the caecum, was slightly broken down in its center, apparently a beginning ulceration. Some twelve or fifteen ulcers were found in the small intestine. They were chiefly located in the ileum. These ulcers were clearly defined, circular, deeply injected, about one-sixth or one-eighth of an inch in diameter, and situated opposite the mesenteric attachment." The typhoid bacillus was recovered from the spleen by means of plate and potato cultures and sections of the kidney and spleen contained bacilli corresponding in size and shape to the typhoid bacilli. Two of the other animals also had ulcers in the ileum.

The primary object of the experiment was to determine the physiological effects of typhoid ptomaines formed in various food stuffs. Cultures were made with peptonized milk, peptonized beef, peptonized brain and bouillon, and beef peptonoids. The conclusions of the doctor are:

1st. The bacillus typhosus of Koch and Eberth is the cause of typhoid fever.

2nd. The physiological and poisonous properties of the ptomaines formed by this bacillus will depend in great part upon the character of the food material on which it is growing.

3. Milk is the best diet in typhoid fever, since the ptomaines produced in it do not cause either fever or nervous symptoms.

*La Salute Pubblica II, 280. 1889.

†Medical News, LV., 453. 1889.

THE INFECTION OF SCARLET FEVER.

The following extracts give information in regard to the characteristics of the infection of scarlet fever, of a kind which is of practical value in connection with the adoption of measures for the prevention and restriction of this disease.

Dr. Jacobi,* Professor of Diseases of Children in the College of Physicians and Surgeons, New York, writes as follows:

There is no reason to believe in a primary origin of scarlatina. The efficacy of the virus is so persistent, and it clings so long to clothing, bedding and furniture, that it can be carried and transmitted to long distances by persons, towels, toys, letters, and even domestic animals and articles of food. It is transferable through the whole duration of the disease, from the incubation to the disappearance of the very last symptoms. The incubation of scarlatina may last but a few hours, like that of diphtheria or erysipelas, or as long as nine days; in this it differs greatly from measles, variola, and varicella. The last symptoms may not disappear until long after the fortieth day, which, it is true, is the average termination. The fine desquamation of the second week may have terminated entirely, but the gross peeling, particularly of the hands and feet, extends frequently to the end of the seventh or eighth week. It carries contagion as well as the desquamation of the former weeks, or as the breath of the patient, or his expectoration in the earlier periods. So slow is sometimes the process of elimination that Spottiswoode Cameron claims that the end of the disease is seldom reached before the eighth week, and not always in the thirteenth. Whether the urine or the alvine dejections of the patient can spread the disease is not quite certain; but as long as there is an uncertainty they ought to be treated as dangerous elements, and disinfected and removed.

The London *Lancet* Committee regards the period of contagiousness as running from the first appearance of the rash to the date when all *roughness of the heels and ankles* has disappeared. This time was found to be as follows for the four years from 1878 to 1882: In one year the average number of days was fifty-four; in two years seventy; and in one year seventy-four.†

Dr. Rotch‡ has recently related to the medical class the following histories to impress the truth that the most infectious period of scarlet fever is that of desquamation, while in measles it is readily communicated at the very earliest stage of the disease even before any trace of the eruption is seen. He, however, is careful to remind

*Archives of Pediatrics, VI., 9. 1889.

†An. Univ. Med. Sciences, Vol. I., I—2. 1889.

‡Arch. of Pediatrics, VII., 131. 1890.

his hearers that infection with both diseases may occur at any time during their course.

A boy, six years old, and his sister, four years old, slept in the same room with their beds close to each other. The boy was taken sick May 1, but remained in the same room with his sister during the day and night of May 2. He was seen by me early on May 3, and was then found to have a well-marked scarlet fever. The sister was taken to the country, and the boy left in charge of a trained nurse. There was then absolutely no communication between town and country house by either people, clothes or letter until June 1, when I was called out to see the sister and found her with well-marked scarlet fever. There were no other cases of scarlet fever in the vicinity of the country-house. The boy at this time was desquamating freely, and the sister was found to have received from the boy, on May 26, what she called a letter, directed from the boy's scarlet fever room by the nurse. The sister had kept this letter by her in bed and under her pillow.

The boy, so far as the closest study of the case could disclose, had, during the period of his desquamation, infected his sister at a distance of twenty miles, by enclosing the scarlet fever contagium in an envelope, and this sister had, in the beginning of the boy's sickness, been in the same room with him for thirty-six hours without contracting the disease. In the following year, March 20, I was again called to see the same boy. He was well in the morning, but in the afternoon was found to have a high pulse and temperature, with cough, coryza, and lachrymation, so that it was deemed best to send the sister, who had only been in the nursery with her brother a few hours after he had been taken sick, to her aunt's house, where she was absolutely isolated from the boy. The boy showed a measles efflorescence on March 24, and the sister was taken sick with measles March 30. The sister was then infected at the very beginning of the boy's attack of measles, and after only a few hours' exposure.

THE MOST SUSCEPTIBLE PERIOD OF LIFE.

Dr. Arthur Whitelegge,* Medical Officer of Health, Nottingham, England, read, a year ago, a paper of unusual excellence on scarlet fever from which we make a few extracts of practical value.

He quotes the Registrar-General's Annual Report for 1886 to show that "the liability of the unprotected to infection is small in the first year of life, increases to a maximum in the fifth year, or soon after, and then becomes rapidly smaller and smaller with the advance of years."

In shielding a child against the infection during the first few years of his life there is a double gain; every year of escape from scarlet

*Trans. Epidemiological Society of London, VII., 153. 1889.

fever renders him less and less susceptible, until finally he becomes almost insusceptible; and secondly, even if he should ultimately take the disease, every year that the attack is deferred reduces the danger to life which it brings. In other words, attacks of scarlet fever become both less severe and less frequent with every year of age after the fifth. Up to the fifth year the liability is less, but the risk to life in case of attack is very great.

PREVENTIVE MEASURES.

Dr. Love* strongly advocates personal as well as general disinfection in scarlatina. His method is to apply freely to the desquamating surfaces, carbolized olive oil and glycerine, afterwards sponging off with dilute listerine (1-12) or antiseptic cologne, containing one part of corrosive sublimate to two thousand of cologne; this is done each day.

In confirmation of his opinion, the author quotes Dr. F. C. Shattuck, who states:

"From the moment that the disease is declared, the patient should be thoroughly anointed daily with carbolized vaseline, lard, or the like, and this should be kept up until desquamation has ceased. Not only is the comfort of the patient promoted, but the danger of the spread of the infection is thereby greatly lessened."

Baeumler† gives some statistics showing the high rate of mortality from scarlet fever. Regarding the prophylaxis against scarlatina, the two questions arise, whether this is possible, and whether it is necessary. Though this disease is much more dangerous than measles, the disposition to get it is very much less. Only in a few of the early years of childhood is there a really considerable tendency to catch it from others, and this rapidly grows less with advancing age. An important point, therefore, is that the longer a child can be protected from the disease, the greater is the likelihood that it will escape it entirely.

As is well known, the contagium of scarlatina is always derived from some other case; it possesses a very great vitality; it is active from the earliest beginning of the disease until far into convalescence; and it usually requires a very short period for its incubation. The author reports cases to show that the breath may carry the contagion before the appearance of any eruption, though the chief danger is during the stage of desquamation. It is therefore absolutely necessary to isolate patients as soon as possible. The clothes can be disinfected, but it is virtually impossible to disinfect the epithelial covering. A fixed time during which the patient must be isolated cannot, therefore, be named, but the child must remain

*The Satellite, I, 10. 1887.

†Munch. med. Woch., 1888, No. 42, 703. (Am. Jr., Med. Sciences).

away from others until the shedding of the epithelium, especially that of the palms and soles, is entirely completed. The author has known this to require sixty-three days from the onset of the disease, and a still larger number has been reported by others. Desquamation can perhaps be hastened by bathing with soap and warm water, and the dissemination of scales hindered by inunctions. It is very important that the scalp be treated in this way, as the scales of this part are fine and are shed early. A convalescent room is of especial value for those patients who feel well, but who cannot with safety mingle with others.

Children who have come in contact with cases of scarlatina should remain under observation ten or twelve days before again joining other children. Those in attendance upon the patients should wear some outside garment in the sick-room and change their clothes and wash their hands in carbolic water on leaving it. The sick-room should be thoroughly aired every day, with proper precautions that the patient take no cold. All the linen used about the patient is, while in the sick-room, to be put in a three per cent. carbolic acid solution, and then boiled with a strong soap. Shoes are to be disinfected with a carbolic water, and the clothes treated with steam. The walls of the sick-room, if papered or painted, are to be rubbed down with bread after the patient has been removed, the iron and the wooden furniture and the floors washed with a carbolic solution, and the curtains, mattresses, etc., subjected to steam. Special vehicles should be employed to bring children with scarlet fever to hospitals. Finally, precautions should be observed against the carrying of the disease by third persons, domestic animals, books, letters, milk, etc.

Referring to the great danger of nephritis (inflammation of the kidneys) in scarlet fever Dr. Rotch* gives the following advice which is valuable not only as regards the safety of the patient, but that of the public as well; for there is an urgent need of longer periods of isolation in this disease than the general public understands to be necessary.

It may be merely a coincidence, but it seems of some significance that in the first year of life, where the food so universally is milk, should also be the period which is least likely to present scarlatinal nephritis. I am in the habit of putting my scarlet fever patients on an absolutely milk diet from the beginning to the end of the disease, or at any rate in the first four weeks. It is possible that in this way, in a certain number of cases, the precipitation of a marked nephritis is avoided, while, if it develops, the patient is already on a diet which is best suited to the disease. *The patient should be kept in bed until the desquamation is almost over, and confined to the room until the desquamation is entirely over.* In the fourth week, towards its end, the diet can gradually be increased b the addition of soup and bread. It is well to keep the child in the house for five or six

*Arch. of Pediatrics, VII., 138. 1890.

weeks, and still longer if the weather is not pleasant. The urine should be frequently tested for albumen (preferably in the sick-room) during the first three weeks, and afterwards, when the child is first allowed to get up, after each change in the diet, and after first going out. If albuminuria appear, the child should immediately be put back to bed and on to milk diet until the albuminuria disappears. Remember that these mild cases are the very ones in which a nephritis is liable to occur, and therefore watch them vigilantly until they are out of danger, which is usually in the fifth or sixth week.

TETANUS (LOCKJAW).

Tetanus, until a few years ago regarded as purely a disease of the nervous system, is now shown to be infectious, usually communicated by inoculation. In the early part of 1884 two Italian investigators Carle and Rattone published their successful results in transmitting tetanus from man to animals. In the latter part of the same year Nicolaier in the Hygienic Institute at Göttingen discovered that certain micro-organisms of the ground when inoculated into mice, rabbits and guinea-pigs produced symptoms similar to those of tetanus, and that, with the application of particles of earth taken from some soils, tetanus could be produced in certain species of animals. In the early part of 1886, Rosenbach, in the same city, made it more evident by his inoculation experiments from man to animals that the tetanus of inoculation is identical with human tetanus, and his bacteriological examinations of the different organs of the body, with negative results, led him to the conclusion that the bacillus described by Nicolaier, multiplied only in the immediate vicinity of the wound and there gave origin to a poisonous principle, the absorption of which produced symptoms somewhat similar to those which would be caused by strychnia. As we mentioned in the Second Annual Report, Brieger was able to extract from cultivations of the tetanus bacillus, which, however, were not pure, but were intermixed with another bacterium, a basic substance that he named *tetanin* and which produced tetanic symptoms in mice, frogs and guinea-pigs.

An important addition to our knowledge of tetanus was made by Beumer.* He was able to show that the tetanus of new-born infants (trismus nascentium) is identical with ordinary tetanus and is usually caused by inoculation of the umbilicus by want of cleanliness. He showed further, by examining a large number of samples, that the

*Zeitschrift für Hygiene, III., 242. 1888.

bacillus was present, not only in many soils, but frequently in the dust and other dirt of dwellings.

Success in cultivating pure cultures of the bacillus of tetanus was reserved to Dr. Kitasato*, a Japanese physician working under Koch in the Hygienic Institute of Berlin. The tetanus bacillus does not thrive in the presence of the air, and he succeeded in getting pure cultures only by substituting an atmosphere of hydrogen gas. With the inoculation of pure cultures so produced he was enabled to cause tetanus promptly in rats, guinea-pigs, rabbits and mice, and to show, in this way, that there was no need of the help of foreign bodies, as earth, splinters of wood, etc., to produce positive results.

As to the life of the bacillus and its resistance to destructive agencies Kitasato learned that silken threads soaked in pure cultures of the bacillus and then dried for several days over sulphuric acid in the dessicator, and afterward preserved in the ordinary atmosphere, retained their virulence for several months, and the same was true o the bacilli when mixed in sterilized earth and kept for the same length of time.

Tetanus bacilli containing spores are not injured by an exposure for one hour to moist heat of 176° F., but are destroyed in five minutes by steam at 212° F. Spores on silk were virulent after ten hours subjection to the action of a five per cent. solution of carbolic acid, but after fifteen hours they were destroyed. In five per cent. carbolic acid solution with one-half per cent. muriatic acid, they were destroyed in two hours, as also when they were exposed for over three hours to a 1 :1,000 solution of corrosive sublimate, or in thirty minutes when exposed to a 1 :1,000 sublimate solution with one-half per cent. of muriatic acid added.

In connection with the present views as to the causation of tetanus by inoculation with the earth bacillus, the following cases are not without interest:

A six years old boy went to school as well as usual on the 7th of June, but when he returned at 4 P. M., he complained to his mother of pain in his teeth and stomach. When he ate his supper it was noticed that he chewed his bread and butter slowly and with apparent difficulty. Through the early part of the night he was restless and in the morning he awoke with difficulty in breathing. The jaws were immovable, the face cyanotic, and the head drawn backward. Death ensued the following night.

In the hospital where he had been received, a careful examination of the child was made as soon as he arrived to discover whether, upon any part of the body, there had been a wound or injury. There was discovered on the ball of the great toe a small sharp

*Zeitschrift für Hygiene, VII., 225. 1889.

stone driven into the skin. Upon pressure the minute wound, from which the stone was removed, gave a drop of pus. The boy had gone barefooted for about two weeks before his sickness.

Out of the depths of the small wound a small portion of the bloody serum was transferred on a platinum wire, and culture media inoculated with it, and in these cultures was found the bacillus which had already been described by Nicolaier and Rosenbach as the germ of tetanus. From the immediate vicinity of the wound minute bits of tissue were removed and inocculated into animals, reproducing tetanus in all of the six which were used.*

Dr. Widenmann† of Stuttgart observed the following case of tetanus:

Hermann K., fell August 24th, 1888, from a wall back of his father's house striking his right cheek upon a small stake driven into the earth and inflicting a slight wound which neither he nor his parents thought anything of, but two days later, on account of some swelling of the face, he was seen by a physician. From beneath the crust covering the small wound the physician pressed a few drops of pus and applied an antiseptic bandage. November 1st, the first symptoms were apparent and the child died of tetanus on the 3rd.

Two small splinters of wood which were extracted from the wound were sent to the Hygienic Institute at Breslau, together with some of the earth in the vicinity of the stake, and the following tests were made with them.

Particles from the splinter which appeared to be clean, that is, free from earthy particles, produced in mice very rapid and fatal tetanus. Subcutaneous inoculations with pus from the dead mice reproduced the same disease in other mice. Inoculation with the earth in small quantities produced tetanus in mice; when inoculated in larger doses the deaths of the experimental animals rapidly ensued from malignant œdma. In this instance the bacillus described by Nicolaier and Rosenbach was not discovered.

CEREBRO-SPINAL MENINGITIS.

Dr. Kohlmann,‡ district physician of Remagen, narrates the history of some cases of cerebro-spinal meningitis in his town which he thinks show that the infection of this disease may be carried in clothing. Translated and condensed, the facts are as follows:

In the night of December 19th and 20th, Franz M., a hotel keeper, seventy-one years old, and hitherto always well, was attacked with a light form of the disease. He recovered.

In the same house January 9th, Theodor M., eighteen years old, and always well, son of Franz M., also a mild form of the disease from which recovery began in four days.

*Zeitschrift für Hygiene, III., 250. 1888.
†Zeitschrift für Hygiene, V., 522. 1889.
‡Berliner Klinische Woch. XXVI., 375. 1889.

January 16th, Johanna, twenty-three years old, the daughter of Franz M., hitherto well, was taken with the initial symptoms of cerebro-spinal meningitis and died forty-eight hours afterwards.

On the 29th of January, Bernhard B., a fourteen years old lad, well, but never very strong, was taken with cerebro-spinal meningitis in a severe form, and died in seventy-two hours after the beginning of the attack. This case occurred in the same city but in a street remote from the one on which the M's lived.

February 2nd, after some days of premonitory symptoms, in which the patient complained of severe pain in the upper part of the spinal column, tenderness of the spine, stiffness of the neck, and a few times tonic spasms of the upper extremities, intermitting with clonic spasms, the mother of the deceased Bernhard B., fifty-seven years old and hitherto well, was attacked with croupous pneumonia and died on the seventh day. In connection with this case the writer calls attention to late views as to the identity of the contagion of cerebro-spinal meningitis and pneumonia.

In his investigations as to possible infection, the author believed himself justified in referring the origin of all these cases to one which occurred in August of the preceding summer. On the 25th of August, the seventeen year old daughter of a poor family in the city returned home on account of sickness from another town where she had been working as a servant girl. Dr. Kohlmann attended her, and she died of cerebro-spinal meningitis on the ninth day of her sickness. The remains of this girl were kept four days before burial in a room occupied by the family, and on account of poverty the father and the brother of the dead girl were obliged each to borrow a coat for the funeral. Now it so happened that the father borrowed a coat from Franz M., whose sickness formed the first case narrated in the preceding, and the brother borrowed a coat from Bernard B.

Only from these two houses upon different streets was clothing borrowed. The borrowed coats were retained in the house several days after the funeral.

Only one other case occurred in the city in a woman of eighteen who had visited Johanna several times during her few days sickness. She recovered. Everything possible was done in the way of isolation and disinfection and no other cases occurred.

Dr. Corney,* Colonial Surgeon to the Fiji Islands, gives an interesting narrative of an outbreak of epidemic cerebro spinal fever in those islands. He states that the epidemic was truly appalling. There is reason to suppose that the disease was brought from other

*Trans. of the Epidemiological Soc. of London, VII., 110.

islands where its ravages were confined to the persons of certain emigrant laborers introduced from other islands in the Western Pacific. But on the other hand, these people had been too long in the colony to allow one to believe that they had brought the disease with them, in the way in which ordinary zymotic diseases can be transplanted. The epidemic showed a marked preference for the natives of four particular localities. There were 128 cases, of which 90 terminated in death.

The peculiarity of the distribution of the cases of cerebro-spinal fever in this epidemic early suggested to me the probability that the disease was infectious from man to man, but that very close association was necessary for its propagation. Subsequent observation failed, in my opinion, to disprove this theory, although I am still unable to assert that any very salient facts support it.

In the German regulations for preventing the spread of epidemic cerebro-spinal meningitis the public are instructed that it has been shown that this is a communicable disease, that the disease is accompanied with a high rate of mortality, and that a frequent after effect of the malady is deafness, and in children, deaf mutism. Physicians are required to give notification of cases coming to their knowledge, persons sick with this disease are to be isolated from other persons as much as possible, children from houses infected with it are to be excluded from the schools, and a thorough disinfection is enjoined, of the sick-room, of all excreta, and of clothing and other things used by the patient.*

CONTAGIOUS PNEUMONIA.

A report was read by Weill† before the medical society of Lyons on a localized epidemic of contagious pneumonia.

The outbreak occurred at a baker's establishment and affected three young men who successively contracted pneumonia and were sent to the hospital. The starting point of the outbreak was probably from a child of the baker, ten years of age, who had a cough and expectoration, the exact nature of which is not determined. During the convalescence of this child, a young man, Jean, 24 years old, was taken the 10th of December with pneumonia.

December 15, a second man, Martin, 37 years old, was called from a distant part of the city to take the place of Jean. He slept in the same bed and under the same clothes that had been used by Jean, and 48 hours after his arrival, December 17, he presented marked symptoms of pneumonia.

*Centralblatt für all. Gesundheitspflege, VIII., 285. 1889.

†Lyon Medical, LX., 640. 1889.

December 18, a third man, Manon, aged 18 years, was brought from still another quarter of the city. This young man had coughed for two months, but had not felt sick and was not prevented from working. He slept with Martin on the night of his arrival. Thirty-six hours after coming he was attacked with pneumonia.

Dr. Marx* describes a series of cases of pneumonia observed by him which were pretty clearly due to infection from case to case.

On the 21st of October, 1888, M. came down with pneumonia, and died on the seventh day. The patient lived in a small house containing only kitchen, living-room and sleeping-room.

On the third day of the sickness of M. his wife was attacked with pneumonia and recovered after eleven days sickness.

A daughter of the M's, a maid of seventeen, who worked away from home, visited her parents during their sickness, and, having walked a long way, was somewhat exhausted when she reached home. She remained with her parents through the afternoon, and, not feeling very well, went to her uncle's and there came down with pneumonia. She recovered.

During the sickness of this young woman she was visited by a friend, a girl of eighteen, and she was taken with pneumonia two days after her last visit. She recovered.

During the illness of the M's they were helped by S., fifty-seven years of age. Some days after the death of M., S. had an attack of pneumonia and recovered. He had already passed through three attacks of the same disease.

During the sickness of S., he was visited repeatedly by a neighbor, C. Five days from the beginning of S's sickness, C. was attacked with pneumonia and recovered. He had already had two attacks of pneumonia.

Just before his sickness, and during the period of incubation, C. was visiting the house of D., where he entertained himself for long periods of time with a boy fourteen years of age, recovering from measles. The boy was out of bed and fully convalescent. Two days after the sickness of C., the boy came down with pneumonia in a severe form, but finally recovered.

Marx concludes that pneumonia may be infectious.

INFLUENZA.

Before the late wide prevalence of influenza the general opinion as to the etiology of the disease seemed to be preponderatingly in favor of a miasmatic, or at least an aerial source of the causative agent. At the present time, as far as can be judged from a careful watching of the current literature, this epidemic has divided the medical profession into two parties, probably not very unequally distributed as to numbers, the one believing in the communicability of the

*Allg. Med. Central-Zeitung, LVIII., 350. 1889.

disease from person to person and the other believing in its atmospheric origin. Still a third class may be mentioned, believing that the disease is communicable and also spread by the atmosphere. As bearing on the questions involved, the following observations and opinions, mostly from late journals, are perhaps worthy of record in this place.

Dr. Da Costa* says: "We know nothing of the cause of this disease. It is epidemic and I think myself that it is feebly contagious." Dr. A. Jacobi† speaks as follows of the infectiousness of influenza: "The disease seems to be not only miasmatic, but also intensely contagious with a very short period of incubation."

In a discussion before a Berlin medical society‡ Dr. Ewald expressed his disbelief in the direct communicability of influenza; Dr. Fränzel also doubted its infectious nature; Dr. Meyer, from an observation of about two hundred cases, believed that the spread of the disease occurs through contagion; Dr. P. Guttmann thinks that proof has not yet been brought of the infectiousness of influenza, while Dr. S. Guttmann referred to the case of the French school ship "La Bretagne" in proof of the communicability of the disease. Dr. Henoch had observed in the children's department of the Charité Hospital no undoubted case of influenza, which he thought was due to the fact that no child with influenza had been received from without, and believed that this fact might be accepted as evidence in favor of the contagiousness of the epidemic for in all the other divisions of the hospital the disease had been very prevalent.

A similar want of unanimity is shown in the discussions before American medical societies.

A correspondent of a London journal§ communicates a portion of a letter received from Dr. Bäumler, director of the medical clinic in Fryeburg in regard to the contagiousness of influenza.

Dr. Bäumler considers the disease to be highly infectious, as "many patients that were in the ward for other ailments were almost at once seized when a single case was admitted into the ward. This quite coincides with what your countrymen, Haygarth and Falconer, have made out in the last, and the beginning of this, century. It was probably the suddenness of the spreading which made it appear improbable that the disease spreads from the

*Medical News, LVI., 62, 1890.

†Medical News, LVI., 262. 1890.

‡Deutsche Med. Woch. XVI., 71. 1890.

§The Lancet, I., 1890. 103.

sick to the healthy by direct infection. The incubation period is evidently very short. Why should there not be diseases with an incubation of only a few hours, when we know that in scarlatina it may be less than a day? I think that the notion, or rather hypothesis, that the disease is due to a miasm is much more improbable than that it is a truly contagious disease."

In a convent-like institution in Charlottenburg near Berlin where the inmates, all women, are rigorously cut off from intercourse with the outer world, not one of them had influenza *

Dr. Trudeau† who has charge of the sanitarium for consumptives in the Adirondack region as soon as the epidemic of influenza appeared in the neighborhood quarantined the institution strictly against the disease, and while the great majority of people in the surrounding country, as well as the visitors at the hotels and boarding houses in the neighboring village, were attacked, no case appeared in the sanitarium.

As an example of the contagiousness of la grippe, Dr. Proust read at the Academy of Medicine an extract of a report from Dr. d'Hoste, surgeon of a mail boat called Saint-Germain. The boat left Saint Nazaire on December 2nd, for Vera Cruz, in excellent sanitary condition. It put in at Pauillac on the 6th, having touched at Santander on the 5th. At this port there embarked a first class passenger, coming from Madrid, where la grippe was raging. Till then the health of the passengers and crew was perfect, but on the 6th the passenger from Santander was seized with the disease, and gradually, from December 12th to January 7th, 154 passengers out of 436, and 47 of the crew were, in their turn, affected. The epidemic, however, was slight and no death occurred. The conclusion was, that it is a contagious malady, transmissible not only in its graver complications, as established by Prof. Bouchard, but also in its simple and benign form.‡

A French Journal§ gives the following:

The training ship "La Bretagne" lay in the harbor of Brest with 850 men aboard, and had 244 cases of influenza. In the harbor by the side of this vessel lay two other training ships, each with the same number of men on board, but on these two ships there has not been a single case of influenza. Dr. Danguy who reported the facts, believes that the history of the outbreak excludes climatic influences. An officer of "La Bretagne," whose residence was in Brest, received a box from Paris, the unpacking of which he personally attended to. Three days afterward, December 12th, the officer sickened with influenza and the next day all his family were attacked. On the 14th, still sick, he went on board the ship "La

*Lancet, I., 1890. 110.

†Medical News, LVI., 185, 1889.

‡The Lancet, I., 1890. 379.

§Revue D'Hygiene, XII., 8. 1890.

Bretagne;" on the 17th, there were twenty cases of influenza aboard the ship, the next day forty-five, and by the end of the month there were 244 cases.

Dr. Bolton, writing from Kustendjie in Bulgaria on the Black Sea to an English medical journal*, says that he had a very complicated case of influenza, and the patient supposed to be in a dying state, her brother was telegraphed for and arrived in the sick-room at one P. M., and remained through the night, attending his sister. The next morning this brother was found suffering from influenza, the first symptoms of the disease, the shivering, having come on thirteen hours after his arrival in the sick-room. This man asserted that in his country village in Bulgaria, whence he came, there existed no cases of influenza and that he could not have caught the disease at any village on his route, as he stopped at none.

Dr. Bolton also communicates the following case to show that the infection is carried through the air and says he can vouch for the facts.

An Armenian arrived here from a village fourteen hours distant to consult me regarding a brother who was suffering from phthisis. In course of conversation I asked him if there were any cases of the epidemic in his village. He replied, "Oh yes, nearly all have been in bed with the same complaint you have here, and many have died." I then inquired if his village had much communication with other places where the disease had already existed. He replied, "Certainly not. At this season there is no need of communication, and I am sure I am the only individual who has left the village for some weeks." He also states that since the disease first appeared in his village, now two weeks since, no one has come to or gone from there.

In former epidemics of influenza, outbreaks have been recorded as occurring on board ships many days out to sea. It is said† that in the present epidemic influenza appeared on board a French steamer, the Alphée on a voyage from Constantinople to Marseilles. All of the passengers and the greater part of the crew were affected, only six men and the captain being available to work the vessel. No information is given as to the time out when this outbreak occurred nor as to whether any of the passengers or their baggage had come from infected places.

*Lancet, I., 1890. 215.
†Lancet, I., 1890. 107.

INFLUENZA OF ANIMALS.

The question has been asked quite frequently, but has received no definite solution, whether the influenza of man and that of the lower animals, especially of the horse, are identical. Dr. Schneidemühl* of Kiel divides the influenza of the horse into two distinct diseases: 1st, the genuine epizoötic horse influenza (Pferdestaupe); and 2nd, contagious pleuro-pneumonia of the horse (Brustseuche). The first disease (Pferdestaupe) is known in France as *fievre typhoide des chevaux*, in England as "horse plague" and "equine distemper," and in America as "pinkeye." Its infectiousness is great, and it can, in a short time, extend over wide regions, yet the infection is fleeting and is supposed to be distributed by the air of expiration. Dieckerhoff succeeded in communicating the disease by subcutaneous and intra-venous injections of the blood of sick horses. The infection is communicable directly from animal to animal and also through the medium of persons, straw, thermometers, etc. One attack of the disease usually confers immunity against future attacks. According to the investigations of Dieckerhoff the period of incubation is five to seven days.

In the second form, infectious pleuro-pneumonia of horses, the disease is communicable, but not in so great a degree as the true influenza. Of horses exposed to the infection, from thirty to forty per cent. escaped the disease, yet the prognosis in animals attacked is not so favorable as in the first mentioned disease. The communication of this disease to men and to other animals has not yet been observed. Infection in this disorder is communicated directly from animal to animal, and not less frequently through the medium of attendants, horses that have not had the disease, clothes, provender, and sometimes by dogs. The convalescing animal is particularly dangerous to other horses, and the infection may be transmitted for weeks after apparent recovery.

Schneidemühl refers also to the influenza of dogs and characterizes it as an infectious disease, especially affecting those in the first year of life. The period of incubation is from four to seven days, and the symptoms are principally catarrhal, affecting the mucus membranes of the eyes, and of the respiratory and digestive tracts, together, in many cases, with severe affections of the nervous system. It is usually accompanied with a pustular eruption. The

*Deutsche Med. Woch. XVI., 153. 1890.

prognosis for the animals affected is unfavorable—from sixty to ninety per cent. die.

The same author seems to be inclined to the opinion that there is some close relationship between these animal influenza, and the human form of the disease, and mentions various observations and pieces of information which he thinks support this view.

When human influenza was prevalent in Russia, from a Russian journal he learns that the influenza of dogs was never so prevalent in St. Petersburg as in the past winter. In Austria according to the *Allgem, Wiener med. Ztg.* influenza of horses had not been so prevalent for years as it was in the fall and winter before the epidemic of human influenza. The disease was especially prevalent among military horses. During the winter horse influenza was remarkably prevalent in Germany. Communications in German veterinary journals spoke of the extended prevalence of horse influenza in a comparatively mild form, and some of the writers speak of the remarkable similarity of the disease to human influenza. The animals are attacked suddenly with severe shivering while harnessed to their wagon, and hardly able to stand and are brought with difficulty to their stalls. In most of the cases the symptoms, which were at first severe, had disappeared in a very few days. An Italian journal mentions the extended prevalence of horse influenza in certain parts of their country.

Dr. Scheller* observed an outbreak of influenza in the spring of 1889 among the horses of one of the German cavalry regiments which appeared to be communicated to the men of that regiment. The height of the prevalence of the human influenza followed from two to three weeks after the horse influenza was at its height. He mentions also some individual cases of apparent direct communication from horse to man which seemed to support his views as to the relation of horse influenza to the disease as it appears in man.

The Sanitary Inspector for January, 1890, referred in the following words to a paper by Dr. Judson of New York, on the "History and Course of the Epizoötic among Horses on the North American Continent in 1872-3."†

The outbreak resembled very much outbreaks of influenza in man. It started in the Province of Ontario, near Toronto, the latter part of September, 1872, and extended in all directions with consider-

* Deutsch Med. Woch., XVI., 163. 1890.

† Trans. of the American Public Health Association, I., 88.

able rapidity, and eventually reached every part of the main land of this continent that had communication by means of horses or mules, with places where the disease existed. Prince Edward Island escaped because the rigors of a northern climate closed navigation between it and the neighboring provinces before the influenza reached them Vancouver's Island escaped by means of a quarantine against horses and mules. Key West, Hayti, San Domingo and Jamaica escaped, but they had but limited commercial intercourse with infected parts, and the importation of horses or mules was a rare occurrence. Several places in the main land escaped, due to isolation by mountain barriers or otherwise from infected places.

The conclusion of the author is that the epizoötic influenza spread by virtue of its communicability, and not by virtue of any recognized or unrecognized atmospheric conditions. We may add that the horse influenza of 1872 did not reach across the ocean, but that in other outbreaks in Europe this disease has been investigated and is quite generally believed to be contagious, and we believe the credit of first describing the germ lies between Prof. Shütz of the Berlin Veterinary School and Prof. Lustig.

GLANDERS.

It should be understood by all that glanders is a dangerously infectious disease, communicable to man as well as to horses and other animals, that it never arises from colds or from causes other than the infection derived from previous cases, that it is useless to try to cure a glandered horse, and that his continued life is a wrong against other owners of horses and a serious danger to whomever has anything to do with him. Every glandered horse should be destroyed.

A few months ago many of the medical journals were telling of a distressing case which occurred in the General Hospital in Vienna, in which a physician died from accidental self-inoculation with the virus of glanders.

In August, a man was brought to the hospital suffering from glanders, which he contracted from a horse. After death Dr. Rowlaski, an expert in bacteriology made the autopsy, and produced pure cultures of the glanders bacillus from the virus. But a "Medical Thomas," Dr. Hoffmann, expressed his doubts as to whether the bacillus had still in it, the power of infection. Dr. Rowlaski gave him one of his cultures to perform a series of experiments which proved affirmative. Early in October, having contracted a serious cold, which he treated by hypodermic injections, using the same syringe with which he had performed the experiment on the animals, Dr. Hoffmann found himself seriously ill, and in a

few days was covered with tubercles and ulcers, and died of acute glanders.*

Kiemann† observed a case of glanders in a man, thirty-seven years of age, which at first simulated articular rheumatism. At a later stage there were developed in the skin on different parts of the body and extremities small swellings which had the appearance somewhat of abcesses. Matter from a pustule was examined and the presence of the glanders bacillus was shown, as well as in the blood and urine. Meanwhile it was learned that the man had had the care of glandered horses. Death followed three weeks after the beginning of the disease.

Weichselbaum‡ had an opportunity of observing a case of glanders in a woman who was engaged as a rag-picker, and who probably became infected through the medium of the rags. In the matter from the pustules on her body the bacillus of glanders was found, and pure cultures of the bacillus inoculated into guinea-pigs, produced the disease.

The following letter was written by Dr. Sternberg and has been published for the information and guidance of the United States Army:§

BALTIMORE, July 24, 1888.

To the Quartermaster-General U. S. Army, Washington, D. C.

GENERAL:—In reply to your communication of July 19th, I have the honor to submit the following statements and opinions:

Glanders is an infectious disease in which the infectious agent has been demonstrated to be a living micro-organism, a bacillus.

The bacillus of glanders was discovered by the German bacteriologists, Loeffler and Shutz, in 1882, and the discovery has since been confirmed by several other competent bacteriologists. It is found in the nasal secretions and ulcers of the mucus membrane, in the "farcy-buds" pustules and enlarged lymphatic glands of infected animals, and it is probable that it is also sometimes present in the urine.

It is a slender rod, somewhat similar in appearance to the well-known tubercle bacillus, but more uniform in size and somewhat broader. In preparations stained with fuchsin or with Loeffler's solution of methyline blue, clear spaces are often seen in the rods, which have been thought by some authors to be spores, but this is doubtful, as Loeffler has found that no development occurs after the bacilli have been exposed to a temperature of 55° C. (131° F.) for ten minutes.

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*Jr. of Comp. Med. and Vet. Arch. XI., 70. 1890.

†Centralblatt fur Bak. und Par., V., 351. 1889.

‡Uffelmann's Supplement, III., 209. 1886.

§Brooklyn Medical Journal.

Pure cultures of this bacillus have been shown to produce typical glanders in horses and asses, and it is recognized by bacteriologists as the cause of the disease. The disease may also be transmitted by inoculation to guinea-pigs and field-mice, which animals (preferably guinea-pigs) may be used as a test of the infectious character of the nasal secretions of a suspected animal.

Exact experiments have shown that the bacillus of glanders is killed by exposure for five minutes to a 5 per cent. solution of carbolic acid, or by a 1 to 5000 solution of corrosive sublimate.

In practice it will be best to rely upon boiling water for the disinfection of all articles which can be immersed in it without injury—rope halters, blankets, currycombs, bits, etc. To keep on the safe side, half an hour may be fixed as the standard time which articles to be disinfected shall be immersed in boiling water, or exposed to steam at a temperature of 212° F.

Articles of leather should be repeatedly washed with a 5 per cent solution of carbolic acid or a 1 to 1000 solution of corrosive sublimate; or immersed in such a solution for at least one hour. If the solution can be used hot, say 180° F. without injury to the material, this will be desirable.

All exposed parts of an infected stable should be thoroughly and repeatedly (three or four times) washed with a hot solution of one of the above named disinfectants. The carbolic acid solution (5 per cent) will be preferable on account of the poisonous nature of the solution of the bichloride of mercury; but the latter is less expensive, and under proper supervision there should be no special danger in using it. After its use, feeding-troughs, etc. should be thoroughly scrubbed with hot water to remove all traces of the poisonous salt. The application of a lime-wash to all surfaces, after complete disinfection, will be desirable.

Stables occupied by infected or suspected horses should be disinfected daily by washing exposed surfaces with a 5 per cent. solution of carbolic acid, and nose-bags, halters, buckets used for drinking water, etc., should be carefully washed with the same solution or with boiling water. In view of the reliability of known measures of disinfection, when properly executed, I do not consider it necessary or justifiable to destroy Government property of value which has become infected by contact with animals suffering from glanders.

I do not doubt the propriety of killing animals suffering from glanders or farcy as soon as the nature of the disease is recognized.

Very respectfully, your obedient servant,

GEO. M. STERNBERG,

Major and Surgeon, U. S. Army.

MEASLES.

In some of the eruptive diseases, scarlet fever and small-pox for instance, the early stage of the disease, before the eruption has appeared, is not characterized by so great a degree of infectiousness as later in their course, and with a knowledge of this fact the health officer has good reason to hope that the separation of the well from the sick when made not too late after the first symptoms have appeared, will be successful in saving further infection. In measles it is otherwise; this disease is characterized by a very high degree of infectiousness, even with the appearance of the very first symptoms, resembling those of an ordinary cold in the head, long before the eruption appears. The requirements of public hygiene, therefore, demand a very early separation of the sick from the well, even before it is possible to make a positive diagnosis by awaiting the eruption. As a result of this characteristic of the disease, isolation has never been so successful a preventive measure in measles as in some other diseases; nevertheless this fact is no justification for parents or others to withhold all precautionary measures, or to let children probably in the early stages of infection attend the public schools. On account of the extremely infectious nature of the disease, its early stage of infectiousness, and the fleeting character of the contagium, there is no disease in which the temporary closure of schools as a preventive measure is so often justifiable as in measles.

In an instructive paper, "Notes on the Influence of the Closure of Schools upon an Epidemic of Measles in Cardiff," Dr. Walford* resorted to this measure. The schools of Cardiff were closed four weeks by his advice. During the three weeks previous to the closure of the school, seventy-six cases of measles were reported, and for the three weeks immediately following their opening, only three cases occurred. Three or four weeks after the opening of the schools a list of absentees was obtained from every public elementary school in the sanitary district, and an enquiry was made, which resulted in the discovery of only four cases of measles among the 20,000 scholars of the various schools. Dr. Walford says:

"I am aware that it is frequently stated that on the closure of the schools children will play together in the streets, and meet in houses, and that the epidemic will thus spread still more. Doubtless under these circumstances there is a probability of some infected

*Sanitary Record, X, 513. 1888.

children coming into contact with healthy ones, but the danger of spreading the infection must be infinitely greater when a large number of children are congregated together for hours in over-crowded and badly ventilated school-rooms. It must be borne in mind that measles is probably infectious in the early or catarrhal stage before it is recognized by any one, so that with the most efficient supervision it is impossible to prevent children attending school who are really suffering from the premonitory symptoms, and in a condition in which they are likely to disseminate the disease."

Dr. Dornblüth* emphasizes the fact that human susceptibility to the poison contagium is very general and is restricted to no age, yet individual differences of susceptibility occur, for some children are infected by the first contact with a case of measles, while others take the disease only after three or four weeks living with other children in the family who have the disease. Very young infants appear to be less susceptible than are children of other ages. As showing the very infectious nature of the measles contagium he mentions that in where for sixteen years there had been no outbreak of measles there were 147 households with 418 children. An outbreak of measles occurred in this vicinity, and 401 children in 134 homes were affected. Nearly all the remaining families had only one child, and therefore could more easily keep it isolated. Nevertheless, the infection of measles is very fleeting,—it does not have the persistent vitality possessed by the infection of some other diseases. The assembling of many children in the same room with overheating and want of ventilation favors very much the spread of the disease, and seems to make the infection more virulent. Children should be isolated, especially when there is any tendency to troubles of the chest and when the epidemic assumes an unusually severe form.

DISINFECTANTS.

Hardly in any other department of hygiene has more rapid improvement been made within the last few years than in our knowledge of disinfectants and their intelligent use for the end sought—the destruction of pathogenic germs. Since I gave, in the Second Annual Report, under the title of "Notes on Disinfectants," an abstract of the most important work which had then been done in determining in a scientific way the power of various agents for the destruction of infection, much additional work has been done which furnishes information of a practical character.

*Deutsche Viert. für öff. Gesundheitspflege, XVIII., 214. 1886.

CHLORIDE OF LIME.

In a lecture at the Hoagland Laboratory last year, Dr. Sternberg* re-affirmed his estimate of the value of this agent as a disinfectant in the following words:

A most valuable chemical disinfectant, and the one which the Committee on Disinfectants has placed at the head of the list, after boiling water, is a four per cent. solution of chloride of lime. Numerous experiments were made by the Committee in 1885, and since that time again, under my direction, by Dr. Bolton, the results of which show the great value of this agent. The bacillus of typhoid in bouillon is destroyed by one to two thousand; the cholera spirillum in bouillon by one to one thousand; anthrax spores in bouillon by one to one thousand.

It is cheap and may be purchased by the quantity for three and one-half cents a pound; you can get a pound package from the drug store for fifteen cents. The proportion recommended by the Committee on Disinfectants is six ounces to the gallon of water.

But you must be sure that you have a good chloride of lime. Our tests showed that the common article, as put up in cans and jars, as a rule is of good quality, but it must be in hermetically sealed packages. The disinfecting power of this agent depends upon the hypochlorite of lime present in it; this is an oxidizing agent and must be used in excess. If not, your hypochlorite of lime is destroyed by the organic material present, and after that, if there is an excess of organic matter containing pathogenic germs, you will not have disinfected the whole material, and not to disinfect the entire amount is equal to not disinfecting any of it. There can be no partial disinfection; unless complete it cannot be considered disinfection.

In the final report of the Chairman of the Committee on Disinfectants appointed by the American Public Health Association, Dr. Sternberg† suggests that Standard Solution No. 1 (Solution A, State Board of Health of Maine) be made by adding six ounces of chloride of lime to the gallon of water (about four per cent.) instead of four ounces as hitherto recommended.

In the final experimental work of this committee solutions of chloride of lime of 1:50, 1:100, and 1:200 were uniformly successful in destroying the bacillus of typhoid fever in recent cultures in bouillon, in recent cultures in flesh-peptone-gelatin containing ten per cent. of gelatin, and in cultures in bouillon with ten per cent. of egg albumen added. In tests made with liquid typhoid

*Brooklyn Medical Journal, III., 346.

†Disinfection and Disinfectants, p. 157.

fæces from a patient in the third week of the disease, complete sterilization was not effected by 1:100 chloride of lime solution.

In the above experiments on typhoid fæces, as in all other experiments reported, the amount of material to be disinfected had been made equal to the amount of solution of the disinfecting agent (5 cc. of each) and the time of exposure had been uniformly two hours.

Dr. Jaeger* made an examination of the disinfecting power of various chemical agents with the view of determining their efficiency for the destruction of contagia when applied for only limited periods of time, particularly their comparative value when used in the disinfection of stalls, cattle cars, etc. His estimate of the worth of the chloride of lime as a disinfectant for these purposes is a high one, and he says that, "Among the agents tested in the foregoing experiments chloride of lime is one of the most efficient."

Dr. Nissen† in the Hygienic Institute of Berlin undertook at the request of Koch an investigation into the value of chloride of lime as a disinfectant. The samples used in his experiments were derived from different apothecaries and the quantity of hypochlorous acid contained in them was determined volumetrically. The strength of the solutions of chloride of lime used were from five per cent. downward. They were tested on pure cultures of the bacillus of typhoid fever, bacillus of cholera Asiatica, anthrax bacillus, staphylococcus pyogenes aureus, and streptococcus erysipelatis.

Typhoid bacilli were destroyed with certainty in five minutes with solutions containing not less than 0.12 per cent., irrespective of whether they were filtered or unfiltered. With the higher percentages their total destruction was effected in one minute.

Cholera bacilli with solutions of the same strength (0.12 per cent.) were usually destroyed in one minute and constantly after five minutes exposure.

Only in one point is the action of chloride of lime different from that of caustic lime, viz: in the time required for disinfection. With the chloride of lime only a few minutes are required, while with the caustic lime one or several hours are required.

Anthrax bacilli from the spleen of a mouse just dead, or in a bouillon culture ascertained microscopically to be free of spores, were completely destroyed in one minute with a 0.1 per cent. solution.

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*Arbeiten aus dem kaiserl. Gesundheitsamte, Band V., 247.

†Zeitschrift für Hygiene VIII., 62. 1890.

Staphylococcus pyogenes aureus, and streptococcus erysipelatis were destroyed in one minute by a two per cent. solution of chloride of lime.

The anthrax spores used by Nissen were not of the most resisting kind,—their vitality was destroyed by three minutes subjection to the action of flowing steam, and in one minute by the action of a 1 :1,000 solution of corrosive sublimate with five parts of muriatic acid per 1,000 added.

These spores were seldom destroyed by a five per cent. solution of chloride of lime in five minutes; they often were in fifteen minutes; almost constantly in thirty minutes. In one experiment with a one per cent. solution they were completely sterilized in seventy minutes. Nissen found that the addition of muriatic acid to the chloride of lime solution effected a marked increase in the disinfecting power of the chloride of lime.

Later Nissen received some very resistant anthrax spores. Dried on silken thread, they were destroyed in a 1 :1,000 sublimate solution only after four hours. In flowing steam they were not destroyed in ten minutes, but were in twelve. *In a 5 per cent. filtered solution of chloride of lime they were killed in four and one-half hours.*

CAUSTIC LIME (QUICKLIME, CALCIUM OXIDE).

In 1887 Liborius* published a paper giving the results of his experiments with quick, or caustic lime to determine its disinfecting power. He sums up his results in the following words:

A watery solution of lime of the strength of .0074 per cent. is sufficient to destroy typhoid bacilli in a few hours, and in the proportion of .0246 per cent. it will disinfect cholera bacilli in the same length of time.

Cultures of the cholera bacillus in unfiltered bouillon containing abundant albuminous precipitate, which offer at least as unfavorable conditions for the action of the disinfectant as are present in natural cholera dejections, are completely and permanently disinfected in the course of a few hours by the addition of .4 per cent of pure quicklime, or by two per cent. of crude burnt lime in fragments.

Under more difficult circumstances the most energetic action of the lime was obtained when it was used in the form of pure pulverized caustic lime, or as a milk of lime containing 20 per cent. of the same.

To test the conclusions of Liborius, Sternberg† made a somewhat extended series of experiments. He says:

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*Zeitschrift für Hygiene, II., 15.

†Disinfection and Disinfectants, p. 172.

The above experiments suffice to demonstrate the fact that pure calcium oxide has no great value for disinfecting purposes, and now that the proposition of Liborius to give it the preference over chloride of lime on account of its comparative cheapness is based upon a misconception of the *practical* value of the two agents for disinfecting purposes. Inasmuch, however, as calcium oxide has considerable germicide power when used in the form of lime-wash, especially after prolonged contact, the general use of lime-wash for sanitary purposes is to be recommended wherever it can be applied to surfaces which are supposed to be infected by disease germs.

Kitasato* concluded from his own experiments that the typhoid bacillus is destroyed in nutrient gelatin and in bouillon by the addition of .0966 per cent. of lime, about thirteen times the proportion found by Liborius to be necessary. This difference he deems to be due to the fact that Liborius diluted his bouillon with fifteen times its quantity of sterilized distilled water, while he used his culture media undiluted.

Cholera bacilli were disinfected with caustic lime in the proportion of .1 per cent. against .0246 per cent. as given by Liborius.

Liborius and Kitasato having determined the minimum quantity of caustic lime to be used for the destruction of typhoid and cholera bacilli, Pfuhl† set himself the task of learning in what quantity and in what form it is best to use caustic lime for the disinfection of typhoid and cholera stools. His experiments taught him that the action of the lime, when added in fragments to liquids to be disinfected, is slow and uncertain. When to the quicklime, as obtained in the market, one-half its weight of water is added, it is slaked to a dry powder. If the hydrate of lime thus resulting is added in the form of powder to typhoid dejections, the powder has a tendency to collect in masses and not mix uniformly with the matter to be disinfected.

Pfuhl found that the best way to use the lime was in the form of milk of lime made by the addition of one part of caustic lime to four parts of water, and thoroughly mixing. This gives a twenty per cent. mixture. Two per cent. of this milk of lime added to neutral typhoid discharges disinfected them completely in one hour.

He therefore concludes that in practice it is best to add to the matter to be disinfected two per cent. by volume of the twenty per cent. milk of lime.

It is self-evident, he says, that the addition of two per cent. of the lime-wash will be sufficient only when it is prepared from lime of

*Zeitschrift für Hygiene III., 416. 1887.

†Zeitschrift für Hygiene, VI., 98. 1889.

good quality, and when used soon after its preparation, or at least within a few days, having in the meantime been excluded from the atmosphere, and when the typhoid or cholera dejections, as is the rule, are of a liquid consistency.

According to his experience it is sufficient in the disinfection of excreta to add the milk of lime until every portion of the matter to be disinfected gives a distinct alkaline reaction, that is, until red litmus paper is colored a deep blue when a drop of the mixture on a glass rod is touched to it.

The results obtained by Liborius, Kitasato, and Pfuhl were so unexpected, and their practical application if correct would be of so much value in practice, that Richard and Chantemesse* thought it worth while to repeat the work of their predecessors. They tested the comparative disinfecting power of lime, using Pfuhl's twenty per cent. milk of lime, and, for purposes of comparison, a solution of corrosive sublimate 1 : 1,000, solution of corrosive sublimate 1 : 1,000 with five per cent. of hydrochloric acid added, and a 5 : 100 solution of chloride of lime.

As matter to be disinfected, they used typhoid and dysenteric stools in flasks, sterilized with heat, inoculated with typhoid bacilli or with the micro-organism thought by the authors to be the pathogenic agent of dysentery. Eight hours afterward the disinfectant was added and mixed with the pure cultures thus secured.

The typhoid bacilli were not destroyed in forty-eight hours by the corrosive sublimate solution, neither were they by the acid sublimate solution. They were not destroyed by the chloride of lime solution in one hour. On the other hand, the milk of lime effected complete disinfection in half an hour.

The dysenteric stools were also thoroughly sterilized in half an hour by the milk of lime, while the acid corrosive sublimate solution failed to do it in twice that length of time.

There is unfortunately a discrepancy, apparently a mistake of the printer, in the statement of Richard and Chantemesse of the quantity of the disinfectant solutions used in comparison with that of the matter to be disinfected.

Schanz† also tested the disinfecting power of caustic lime and was able to confirm the results of Liborius, Kitasato and Pfuhl as to its efficiency in the disinfection of liquids, but he doubts whether it

*Revue D'Hygiene XI., 641. 1889.
*Deutsche Med. Woch. XVI., 77. 1890.

would be suitable for the disinfection of excreta on account of its lack of power to penetrate the more solid masses and particles of fecal matter.

Karlinski* gives his testimony also to the efficacy of lime as a disinfectant. Added to typhoid stools in the proportion of about four per cent., the bacilli were entirely destroyed within forty-eight hours. (See also "Disinfection of Excreta.")

CORROSIVE SUBLIMATE (MERCURIC CHLORIDE).

Though corrosive sublimate destroys infection of all kinds rapidly and with certainty, when it is brought directly in contact with it, it possesses certain characteristics which limit very much the range of its applicability in practical disinfection.

1st. Through its property of coagulating albuminous matters when mixed with liquid or semi-solid matter containing albumen, there is a tendency to the formation of a protective coating, or layer of coagulated albumen around the more solid particles or masses, thus protecting their interior against the action of the disinfectant. This property of the sublimate renders it less suitable than some others for the disinfection of excreta, and still more unsuitable for the disinfection of tuberculous or other sputum. For the disinfection of material of these kinds, chloride of lime has a great advantage over corrosive sublimate.

2d. Mixed with organic matter, especially with albuminous matters, the corrosive sublimate itself suffers decomposition into inert compounds, or at least into those with questionable disinfecting powers. Here corrosive sublimate, compared with carbolic acid, is at a disadvantage. Carbolic acid, though coagulating albuminous matters, is not itself decomposed or destroyed, but remains unimpaired, constantly exerting its power of destroying infection.

3d. Corrosive sublimate is a dangerously poisonous agent. A safeguard to some extent against accidental poisoning is offered by the coloring matter, in Solution B, potassic permanganate; in Solution C, copper sulphate. Carbolic acid is also a rapidly fatal poison when swallowed. Neither agent should be trusted in the hands of unintelligent or careless persons.

4th. Another disadvantage of corrosive sublimate is its corrosion of metals or amalgamation with them. Nor can it be poured through

*Centralblatt für Bak. und Par. VI., 75. 1889.

the leaden pipes of our plumbing fixtures in large quantities without destroying them.

After enumerating the limitations in the uses of corrosive sublimate, there remains still a field in which it is useful,—the disinfection of rooms (walls, floors, furniture) and clothing. Sternberg* says:

A solution of bichloride of mercury of one to one thousand is probably the most valuable and useful solution for washing surfaces and scrubbing floors and woodwork, and for disinfecting the hands and surfaces generally, and also as a solution in which to immerse clothing which cannot be boiled. For instance, in the sick room you are not prepared to send soiled clothing at once to the laundry, and, indeed, it might not be safe to do so. You should, therefore, have a proper receptacle containing a solution of one to one thousand bichloride of mercury in which to immerse soiled clothing; allow it to remain one or two hours, or longer, before sending to the laundry.

In the late experiments of the "Committee on Disinfectants," corrosive sublimate, 1:10,000 almost invariably killed typhoid bacilli in two hours in bouillon without albumen, but when 10 per cent. of albumen was added, their destruction required the corrosive sublimate in the proportion of 1:100.

Dr. Laplace of New Orleans, while working in the laboratory of Koch in Berlin, discovered that the addition of acids to solutions of corrosive sublimate prevents the precipitation of albumen by them, and increases the disinfecting power of the sublimate. He recommends adding to the 1:1,000 solution of sublimate five parts of hydrochloric acid or tartaric acid.†

The investigations of Lübbert and Schneider have confirmed them in the opinion that tartaric acid, as well as some other acids renders albuminates of mercury soluble, but that when other salts are present, as in serum, they do not accomplish this end. They show also that the addition of ammonium chloride to solutions of corrosive sublimate made with ordinary water does not accomplish the end of preventing the precipitation of the mercury on account of the disturbing influence of the calcium carbonate. A reaction ensues between the ammonium chloride and the calcium carbonate, resulting in the formation of calcium chloride and ammonium carbonate, and the last decomposes the sublimate and the separation of a "white precipitate" occurs

*Brooklyn Medical Journal, III., 347. 1889.

†Eichmann's Supplement for 1887, p. 179 (From D. Med. Woch.)

Instead of ammonium chloride, they recommend the addition of sodium chloride (common salt) which prevents almost entirely the precipitation of the mercury and renders solutions thus made active in the presence of albuminous matters. For the purpose of preventing the coagulation of albuminous matters, they recommend the use of 1.3 times the quantity of sodium chloride as is used of corrosive sublimate. Solutions of corrosive sublimate should not be kept too long before they are wanted for use.

The corrosive sublimate in solutions made with ordinary drinking water, particularly well water, is decomposed on account of the presence of carbonate of lime and falls out of solution. Light also exerts a destructive influence upon the sublimate and causes it gradually to fall out of solution even when made with distilled water. Michaelis* has shown that antiseptic sublimate solutions may be preserved without change in glass bottles colored brownish-yellow.

CARBOLIC ACID.

After it was learned what remarkable properties corrosive sublimate possesses for the destruction of bacteria, it seemed that this agent would pretty nearly supplant carbolic acid as a destroyer of infection. Soon, however, it was learned that there are many limitations to the use of corrosive sublimate in the practical work of disinfection, and carbolic acid seems to be regaining in many directions much of its lost ground.

In the last report of the Committee on Disinfectants of the American Public Health Association the results of a new series of tests made with carbolic acid by Dr. Meade Bolton are given, and their results accord very closely with those made by Sternberg in 1883. A large number of bacteria without spores were uniformly destroyed with a 1 : 200 solution of carbolic acid and almost uniformly by the 1 : 100 solution. The 1 : 100 solution was destructive of typhoid bacilli in flesh peptone gelatin, and was also destructive in the one per cent. solution to typhoid bacilli in bouillon, containing ten per cent. of dried egg albumen, thus presenting evidence that the disinfecting action of carbolic acid is uninfluenced by the presence of a large amount of albumen. The report says:

Finally we may say that the experiments herein recorded justify the recommendations of the Committee on Disinfectants, for the use of this agent, in their report of 1885, viz., a 2 to 5 per cent. solu-

*Zeitschrift für Hygiene IV., 395. 1888.

tion "for the destruction of infectious material which owes its infecting power to the presence of micro-organisms *not containing spores*."

Dr. Sternberg* said last year:

Carbolic acid, in the absence of spores, is a most effective disinfecting agent, and we have put it seventh in the list below mercuric chloride, although for many purposes it is preferable to this salt. It is now generally used in Germany for the disinfection of the excreta of typhoid and cholera patients. It is not itself destroyed, and may be left indefinitely in contact with the material to be disinfected. Experiments show that a one per cent. solution destroys the cholera spirillum and the typhoid bacillus, as well as the various pus micrococci. So when we direct the use of a five per cent. solution we think we are on the safe side, and it has the advantage of being quite as effective in the presence of albumen as in its absence. It destroys spores after a very long exposure.

Uffelmann† learned from his own experiments that carbolic acid, when used in the strength of a five per cent. solution, did not disinfect typhoid bacilli at the end of one hour, but effected a complete sterilization in twenty-four hours.

For the disinfection of tuberculous sputum Schill and Fischer‡ recommend carbolic acid in a five or ten per cent. solution, the bacilli being subjected to the action of the disinfectant as long as twenty-four hours.

Recent experiments by Laplace show that the addition of hydrochloric acid to a disinfecting solution containing carbolic acid greatly increases its disinfecting power for spores. Thus it is stated that "2 per cent. of crude carbolic acid with 1 per cent. of pure hydrochloric acid destroyed anthrax spores in seven days, while 2 per cent. of carbolic acid, or 1 per cent. of hydrochloric acid alone, did not destroy these spores in thirty days. A four per cent. solution of crude carbolic acid, with 2 per cent. of hydrochloric acid, destroyed spores in less than one hour; 4 per cent of carbolic acid solution alone did not destroy them in twelve days."§

Fränkel§§ has tested the disinfecting action of the mixture of crude carbolic acid and sulphuric acid following the directions of Laplace, viz: the mixing of the two liquids in equal quantities. The mixture should be carefully made as a high degree of heat is evolved, by adding the sulphuric acid gradually to the crude carbolic acid. The mixture resulting is a grayish yellow emulsion

*Brooklyn Medical Journal, III., 348. 1889.

†Deutsche Med. Woch. XVI., 37. 1890.

‡Mittheilungen a. d. kaiser. Gesundheitsamte, Bd, II., 139.

§Disinfection and Disinfectants, 164.

§§Zeit. für Hygiene, VI., 521. 1889.

with a strong smell. Fränkel learned that the disinfecting strength of this mixture varies according to whether it is kept carefully cooled or not during its preparation. Anthrax spores were killed within one day by the action of a 5 per cent. solution of the crude carbolic acid and sulphuric acid prepared cold, while the 5 per cent. solution of the mixture prepared hot required nine days to destroy them.

CREOLIN.

Dr. Sternberg refers to this article as follows in the last report of the "Committee on Disinfectants:" *

Dr. E. V. Esmarch, assistant in the Hygienic Institute in Berlin, has made an extended research upon a product of coal tar distillation called creolin. This is described as a syrupy, dark brown fluid, which smells like tar, and forms a milky emulsion with water. This is perhaps the same material which was introduced in this country some years since under the name of "Little's Soluble Phenyle," and which was tested by the Committee on Disinfectants with favorable results.

"Creolin is decidedly more active for pure cultures of micro-organisms in the absence of spores; but, on the other hand, carbol (carbolic acid) is more potent for masses of putrefying material and retains its disinfecting power longer; it seems as if creolin in contact with putrid matter after some time undergoes changes which neutralize its disinfecting power."

The prompt deodorizing action of creolin and its decided germicide power make it a suitable agent for the disinfection of excreta in the sick room, but we would still give the preference to our standard solution of chloride of lime (containing six ounces to the gallon), as this quickly destroys all pathogenic organisms, including the most resistent spores.

According to the testimony of various quarters, there seems to be great differences between the various preparations of creolin as regards their efficiency as disinfectants. This variability was observed by Esmarch, and has been noticed by subsequent experimenters.

The two principal brands of creolin are a German preparation, Artmann's and an English, Pearson's (Jeyes').

According to the analysis of Weyl† Artmann's creolin contains only 3.4 per cent. of carbolic acid while Pearson's has 22.6 per cent. His experiments on animals show that the claim of the manufacturer as to the non-poisonous character of their preparation is untrue.

*Disinfection and Disinfectants, p. 165.

†Zeitschrift für Hygiene VI., 151. 1889.

though Pearson's is much more poisonous than the other. He calls attention anew to the inconstant compositions of these preparations.

Henle*, with others, found the composition of creolin to vary much, the English preparation containing much more carbolic acid. A 5 per cent. mixture of Artmann's creolin had but little if any injurious effect on the typhoid bacillus in one hour, while even one-half of one per cent. of Pearson's destroyed typhoid bacilli in five minutes. There was the same marked difference as regards the bacteria of suppuration. Henle separated the English creolin into its four principal constituents: soap, used for the purpose of making the emulsion, creolin oil, pyridin, and phenol (carbolic acid). The phenol appeared decidedly to surpass in disinfecting power, solutions of pure carbolic acid in the same percentage strength. Henle concludes that phenol, aromatic carbo-hydrates, and hard soap are the constituents that endow creolin with its antiseptic properties. The removal of one of these substances, is sufficient materially to weaken its disinfecting power.

Jaeger† also, in his studies of substances suitable for the disinfection of stalls, etc., has examined creolin. He obtained his samples from seven different sources, including a sample of the English preparation.

The result of the test with anthrax spores was entirely negative. A 10 per cent. solution failed to sterilize them. With tubercle bacilli the results were favorable. The 10 per cent. solution was uniformly destructive of them.

SULPHUR FUMIGATION.

Dr. T. Mitchell Prudden‡ estimates the value of disinfection by sulphur fumigation as follows:

It is a great pity that in the matter of disinfection of rooms we should in this region still be going through with the inefficient mummery of burning sulphur with closed doors under the impression that it will destroy contagion. This operation has, indeed, a certain archaic picturesqueness about it, and save for the damage which is liable to accrue from the fading of furniture and hangings, is a tolerably harmless practice; but it savors rather of the propitiatory sacrifices to malevolent deities of centuries gone by than of the intelligence of the present time. Sulphurous acid, as it is usually applied in house disinfection, has been shown over and over again

*Arch für Hygiene IX., 188. (D. Med. Woch.)
†Arbeiten aus dem kaiserl. Gesundheitsamte, V., 279. 1889.
‡The Amer. Jour. of the Med. Sciences, XCVII., 476. 1889.

by the most careful experiments to be a very inefficient and unreliable disinfecting agent. It may be better than nothing, but in disinfectants—which are often our sole weapons in fighting epidemics—the best is none too good. The efficiency of sulphurous acid may be increased by securing the thorough wetting of everything to be disinfected, but even then it is not great.

Dr. Wm. H. Welch,* of Johns Hopkins University, Baltimore, holds the following opinion of the value of sulphurous acid gas as a disinfectant:

Whether it be pertinent to this occasion or not, I cannot forbear to add my protest to that of others against placing reliance upon any method hitherto employed of disinfecting houses or apartments by fumigation. And I would, furthermore, call attention to the lack in most cities of this country of public disinfecting establishments such as are in use with excellent results in many cities of Europe, and which are indispensable for the thorough and convenient disinfection of clothing, bedding, carpets, curtains, etc.

All who have carefully investigated the value of sulphur fumigation have generally arrived at the conclusion that, in the concentration which is practicable in the disinfection of rooms, sulphurous acid gas occupies a low rank. In nearly all late European regulations for disinfection it finds no place. Nevertheless, in this country, many practical public health officers believe that sulphur fumigation is not without value. This opinion was brought out quite prominently at the Brooklyn meeting of the American Public Health Association, and in the discussion the importance of supplying moisture to the atmosphere, together with the sulphurous acid gas, was strongly insisted upon as increasing very much the effectiveness of this method of disinfection.

DISINFECTION OF ROOMS.

In the disinfection of rooms sulphur fumigation should occupy a very subordinate place. If used at all it should be intended as only auxiliary to the action of other more potent disinfectants. Woodwork should be washed down in a sublimate solution, Solution C reduced to the strength of 1 : 1,000, or Solution E; picture frames, especially the projecting parts of mouldings, the tops of doors and window casings, and other places that can harbor dust, should be carefully wiped with a cloth wrung from one of these disinfecting solutions, floors should be thoroughly washed in the same, especial

*Sanitarian, XXIII., 113. 1889.

attention being given to disinfecting the spaces between the floor boards, the wall paper should be washed or wiped in the same solutions, unless they are considered too valuable to spoil; clothing should be disinfected by steam or by boiling,—when this is done there is not much left for the sulphur fumigation, and it may be trusted to do it.

A paper by Esmarch* appeared in 1887, which might be paraphrased as "The Disinfection of Walls with Bread," and the author's suggestion for freeing walls of bacteria were so contrary to the reader's sense of the fitness of things that he had to recall himself to the fact that he had not opened a journal given to the travesty of one of the most sacred articles in the creed of the sanitarian. The walls of rooms, whether they are papered, painted or simply finished in plaster, no matter how smooth they appear to the eye, in reality they are not so, and in their niches and on their projecting ledges disease producing bacteria find ample lodgement.

That this is not mere assumption is shown by the experiments of Esmarch. Rubbing 25 square centimeters of the walls of different rooms with bits of sterilized sponge and afterwards making cultures from them, he obtained from the walls of a stable from 231 to over 6,000 bacteria, on the walls of the laboratory, from 2 to 112 according to location and character of surface; in a dwelling room from 2 to 153 bacteria. Some of the results obtained from these preliminary investigations of the germ contents of walls are interesting, particularly in one house in which a part of the paper hanging and painting was old and a part new. In this house, in the living room, on the old paper there were 14 bacteria, another place 12, and another 10; on the new paper, three months old, 5; in the corridor, old paper, 43; in the closet, old paper, 38, in another place, 31; in kitchen, kalsomined wall, 14, oil painted wall, 14; sleeping-room, oil painted, one month old, 1. In another house in which there had been no thorough cleaning of the walls for sixteen years he obtained distinctly higher numbers.

Investigating the condition of the walls after they had been disinfected by various processes, he came to the conclusion that the most efficient method of removing bacteria from them was by rubbing the walls with bread.

For a long while in Germany the cleansing of walls by rubbing with bread had been a process in favor with the public, as in this

*Zeitschrift für Hygiene II., 491.

way, whether papered or painted, they could be, without injury, freed from dirt and renovated in appearance.

Esmarch found that by rubbing down the walls with bread they were freed more completely from bacteria than after washing or spraying with 1 : 1.000 sublimate solution, or 5 per cent. carbolic solution. The superiority of this method of cleansing walls was so conclusively shown that the process has since been adopted in the official regulations of many cities.

The kind of bread and method of procedure recommended is as follows: Common rye bread, new and well baked through, is cut into pieces of a size convenient for the hand so that they may be grasped by the hard outer crust. With these pieces of bread, held so that the hand does not touch the wall, I could very conveniently with moderate pressure rub the walls. * * * * In most of the cases the walls were rubbed only once, and in doing so the surface of the bread was blackened very distinctly. The crumbs falling to the floor are to be carefully swept up and burned, not fed to animals.

An interesting paper was contributed two years ago by Krupin*, a Russian surgeon in the Alexander Barracks-Hospital, St. Petersburg. From the experience in that hospital and from their studies of the current literature, the surgeons were inclined to divide infectious diseases, into two classes, a division of some importance in connection with the adoption of measures for the disinfection of rooms. In one class they placed those diseases whose infection is characterized by a tendency to adhere to surfaces upon which they have found a lodgement, as diphtheria, scarlet fever, croupous pneumonia, small-pox, erysipelas, and dysentery; in the other class, those diseases whose infection is possessed of but feeble powers of vitality, as relapsing fever, typhus fever, and measles.

Upon the opening of the Hospital the process of disinfecting with chlorine gas was adopted for rooms and wards which had contained infectious cases, and in connection with certain diseases this appeared to be sufficient; for example, after typhus fever, typhoid fever, and relapsing fever, scarlet fever, measles and small-pox.

The first doubt as to the efficacy of chlorine disinfection was raised after the disinfection of a barrack on account of diphtheria. In barrack No. 17, containing scarlet fever patients, one case was found to be complicated with diphtheria toward the end of the epidemic. In a short time afterward, several convalescents from scarlet fever in the same barrack were attacked with diphtheria. The barrack was therefore closed, and thoroughly disinfected with chlo-

*Zeitschrift für Hygiene III., 219. 1888.

rine gas. After disinfection, this barrack was washed, ventilated, and for seven months it remained vacant. When it was again opened it was occupied for four months with measles patients, and during this time a few cases of measles were complicated with diphtheria, although none of these patients had had this complication when received. Again the barrack was vacated, still more thoroughly disinfected with chlorine gas and again remained vacant, this time seven months. When it was again opened it was devoted to small-pox patients, and some of these patients had diphtheria as a complication. In addition to these, the barrack physician, two nurses and a waiter, in short, the whole personnel of attendants. Again the barrack was closed, and a third time disinfected with chlorine gas. When this barrack was again opened, it was used for typhoid fever patients, adults only being received, and no further cases of diphtheria occurred.

This experience led them to make an investigation as to the disinfecting power of chlorine gas for certain well-known pathogenic bacteria, particularly anthrax spores. The results of these experiments were not satisfactory, and finally led to the abandoning of chlorine in the disinfection of rooms.

From further laboratory experiments and from a long series of subsequent experiences in the disinfection of rooms, Krupin comes to the following conclusions:

1st. The disinfection of sick rooms is best done by washing or sprinkling with sublimate or carbolic acid solutions.

2d. The most efficient agent for disinfecting rooms is a solution of corrosive sublimate 1:1,000 alone, or half and half with a solution of carbolic acid 5:100.

3d As far as our experience yet shows, these methods of disinfection are entirely harmless for the subsequent inhabitants of the rooms.

DISINFECTION OF EXCRETA.

A series of experiments was carried out by Dr. Foote* in the laboratories of the Yale Medical School for the purpose of determining whether corrosive sublimate is a good disinfectant for feces, and if it is not, whether this is due to the formation of inert, insoluble compounds of mercury with the feces; 2d, to determine the relative value of certain other disinfectants used for this purpose. As a test mixture, normal feces were used, mixed with about two-thirds their bulk of decomposing urine.

The following standard solutions of the disinfectants to be tested were made up according to the following formulæ:

Corros. subl., two drachms; water, one gallon.

*Amer. Jour. of the Med. Sciences XCVIII., 320. 1889.

Chloride of lime, four ounces; water, one gallon.

Sulphate of iron, eighteen ounces; water, one gallon.

Corros. subl., two drachms; tartaric acid, ten drachms; water, one gallon.

Hydrochloric acid, one per cent. (ten drachms to one gallon).

Corros. subl., two drachms; hydrochloric acid, ten drachms; water, one gallon.

Carbolic acid, five per cent. solution.

Corros. subl., two drachms; potass. permang., two drachms; water, one gallon.

These experiments furnished an excellent opportunity to observe the deodorant effects of the disinfectants tested. Sulphate of iron, which is often regarded as a good deodorant, developed an odor considerably more disagreeable than that of the mixture of feces with sterilized water. The odor did not seem to be lessened in any appreciable degree after seventy-two hours when the flask was emptied. The bichloride and the mixtures of the bichloride with hydrochloric acid, tartaric acid, and potassium permanganate are primarily good deodorants. Thus at the end of four hours there was no appreciable odor from mixtures containing these. After forty-eight hours, however, a very sickening odor was developed in all these mixtures. This was not of putrefactive origin, since the mixtures were frequently perfectly sterile. Chloride of lime rapidly destroyed all fecal odor, but replaced it by its own. Carbolic acid also destroyed all fecal odor after four hours.

The experiments showed that:

The bichloride with hydrochloric acid is by far the most efficient disinfectant. Next in order stands chloride of lime, it acts less efficiently, but more rapidly than the bichloride with hydrochloric acid.

The addition of tartaric acid to the bichloride solution somewhat increases its power, though not nearly so much as hydrochloric acid.

The sulphate of iron shows itself totally inefficient, both as a disinfectant and deodorizer, and there is no rational basis for its use for these purposes. One per cent. solution of hydrochloric acid, and five per cent. solutions of carbolic acid, have little power as disinfectants.

The addition of potassium permanganate to the bichloride solution considerably increases its efficacy. * * * * The simple bichloride solution has also shown itself unreliable.

The chemical analyses of the filtrates has shown that considerable mercury exists in solution in them, and the bacteriological tests * * * * have shown that this soluble form of mercury is a powerful germicide—even when diluted one-half, capable of destroying the bacillus typhosus after an exposure of six hours; consequently the inefficacy of the bichloride as a disinfectant does not seem to be due to the fact that it forms insoluble, inert compounds with organic matter, for the compounds are neither insoluble

nor inert, but rather due to the lack of power of penetrating organic matter. This being the case, it is doubtful if an increase, within certain limits, in the proportion of the bichloride to the feces, would increase its efficacy much.

Experiment VI. further shows that one pint of the best disinfectants (bichloride with hydrochloric acid, bichloride with potassium permanganate, and chloride of lime) is sufficient to sterilize a semi-solid dejection consisting of 100 c. c., after four hours' exposure, but that it is insufficient to sterilize, after four hours' exposure, one of 250 c. c. in a small proportion of cases. Therefore, one pint of these disinfectants should be used to every 100 c. c. of a semi-solid dejection.

These experiments were all performed with normal feces. The probability is very slight that these same disinfectants which are efficient in sterilizing normal feces would prove inefficient in cases where pathogenic germs exist, since the spores of the hay bacillus which exist in normal feces are certainly as resistant to the action of germicides as the most resistant pathogenic germs, and far more resistant than the pathogenic germs most common in feces, such as the bacillus typhosus and the comma bacillus.

Conclusions.—The best disinfectants to use are the bichloride with hydrochloric acid, the bichloride with potassium permanganate, and the chloride of lime.

Five per cent. solutions of carbolic acid and two-tenths per cent. solutions of the bichloride are unreliable even when used in the proportion of one pint to every 100 c. c. of dejection.

Emphasis needs to be laid on the necessity of thorough disintegration of the fecal matter by stirring with the disinfectant, and on the necessity of allowing the mixture to stand four hours, at least, before emptying.

For continued use the bichloride solutions would injure lead pipe, while if used for a few days only, probably no injury would result. For long continued use, where the dejections are thrown into a water-closet, chloride of lime is undoubtedly the most available disinfectant.

Solutions of chloride of lime should be kept tightly corked and should not be used after they are one week old.

At the request of the city government of Buda-Pesth, Dr. Gerlóczy in the Hygienic Institute in that city made an extensive series of investigations for the purpose of determining the most suitable agents to be used for the disinfection of privy vaults, sewage, the mud and slime of streets, dry garbage, and fresh excreta, particularly from diarrhœal and typhoid fever patients.

The disinfectants tested were corrosive sublimate, sulphate of copper, sulphate of zinc, sulphate of iron, pure carbolic acid, crude carbolic acid, said to be of some 25 to 30 per cent., carbolate of lime, creolin, crude sulphuric acid, milk of lime 20 per cent., boil-

ing water, hot and cold lye of wood ashes, and strong solutions of common salt.

The conclusions which he deduces from his various experiments are as follows:

As a disinfecting agent for excrement and garbage, corrosive sublimate does not deserve the confidence which it received as the result of the earlier disinfection experiments which were made with this substance. For the disinfection of the contents of privy vaults, corrosive sublimate is not to be considered, because, even in concentrated solutions, the excrement is not disinfected when the solution is used in quantities equal to that of the matter to be disinfected.

From my experiments I can recommend sulphate of copper as an efficient disinfectant. This agent, in the proportion of 1:1,000 of the sewage, rendered it pure and odorless, and it remained permanently sterile. When used in sufficient quantity (and its cheapness permits this) fresh excrement and even the contents of the privy vaults were disinfected. The advantages of sulphate of copper are that it is comparatively cheap, that it is not very poisonous, and that its color prevents mistakes.

With similar positiveness I can recommend the lye of wood ashes. In concentrated solution even when cold it disinfects fresh excrement. Hot lye is still more active and is to be considered as one of the most rapidly acting disinfecting agents.

Pure carbolic acid deserves, in my opinion, a lower place than sulphate of copper or lye, and, in comparison with these disinfectants, is to be still less recommended on account of its price.

Raw carbolic acid is valuable as a deodorizer. Creolin is not to be recommended. (The author does not state what brand of creolin was tested.—A. G. Y.)

(a) *Disinfection and Deodorization of Privy Vaults.*

The complete disinfection of privy vaults can be required only under extraordinary circumstances; for example, in cholera times when the dejections from the first cases have been thrown into the vault. For disinfection under these circumstances sulphate of copper is to be recommended in strong solution, at the rate, at least, of 40 kg. of sulphate of copper to each cubic meter of material to be disinfected. (2½ lbs. to each cubic foot.)

For the deodorization of vaults, crude carbolic acid is suitable, using at the rate of 20 kg. to the cubic meter.

(b) *Disinfection and Deodorization of Sewage.*

For this purpose sulphate of copper is to be recommended. Foul and bad smelling cesspools and outlets may be rendered odorless with crude carbolic acid, and to accomplish this, two parts to one thousand parts of the sewage are sufficient.

(d) *Disinfection of Fresh Excrement.*

For the disinfection of discharges from the bowels, a strong solution of sulphate of copper is effective. One part of sulphate of copper to one hundred parts of excreta being sufficient. A still more efficient method for the rapid disinfection of stools is pouring over them three times their bulk of hot lye (one part of ashes to two parts of water.) A cheap and good disinfectant, also for the same purpose, is milk of lime.

Pfuhl having confirmed the correctness of the results obtained by Liborius* as to the value of caustic lime as a disinfectant for typhoid fever and cholera dejections, communicated, in a second paper,† the results of his use of milk of lime as a disinfectant for privy vaults, latrines, etc.

One of the vaults used by Pfuhl for purposes of experiment belonged to one of the barracks not connected with the sewerage system of the city, and was used by 280 men. By the addition every other day of a quantity of the milk of lime, equal to one litre of the dry hydrate of lime to each one hundred litres of daily increment to the contents of the vault, it was found that a sufficient degree of alkalinity of the whole mass could be maintained to ensure its disinfection.

Pfuhl states that, contrary to expectation, the odor of the vault was diminished in a marked degree. The following method of preparing the milk of lime is recommended:

The lime is so placed in the vessel in which it is to be slaked that every piece touches the bottom. Sixty parts of water are to be added to one hundred parts of burnt lime, pouring it in so that it spreads over the bottom of the vessel and is absorbed upwards into the lumps of lime. Proceeding in this way, with this quantity of water, all excess of water is dissipated by the heat evolved and a comparatively uniform preparation of dry hydrate of lime is obtained which may be preserved for some time by excluding the free access of air from it. To prepare from this hydrate of lime, milk of lime, 5 : 100, it is only necessary to mix one volume of the hydrate of lime with two volumes of water. For general use a milk of lime of half this strength is recommended, one volume of hydrate of lime to four volumes of water.

For the disinfection of excreta Nissen‡ prefers the chloride of lime on account of its more rapid action and great effectiveness.

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*See page 244. †Zeitschrift für Hygiene, VII., 363. 1889. ‡See page 242.

DISINFECTION OF STALLS, CATTLE CARS, ETC.

From the extended investigations of Jaeger* as to the most appropriate disinfectants for stalls, cattle cars, etc., where the disinfection must be done rapidly and usually by a single application, put on with a brush or otherwise, he comes to the following conclusions, given here in abstract:

The principal result of the preceding work is that among the whole series of pathogenic bacteria which have been made use of in the experiments, not a single one has been found which was not killed by one or other of the disinfecting agents used. It is shown that a strict arrangement of the disinfectants in a series according to their efficiency cannot be made, for one acts upon this and another upon that species of bacterium with a greater degree of disinfecting power. It may be mentioned that tubercle bacilli, in all the experiments, have stood at the head of all the bacteria in their power of resistance.

Among those substances which sometimes fail to destroy anthrax spores and tubercle bacilli, but are destructive of other kinds of infection, caustic lime occupies the first place. Among those agents which do not with certainty destroy even bacilli without spores, and, therefore, which should be excluded from use as disinfectants, potassium permanganate and sulphate of iron are to be mentioned. In all of the experiments the former was uncertain in its action, and the latter in solution, 1:30, failed to destroy anthrax bacilli without spores, although these frequently enough perished as the result of simply drying.

The power to destroy anthrax spores with certainty has been shown by only solutions of carbolic acid, with hydrochloric acid added, and a milk of chloride of lime 1:3. In spite of this positive disinfecting power, the chloride of lime is untrustworthy as a disinfectant for tubercle bacilli, and even for the bacillus of glanders. On the other hand, agents which are effective for the destruction of tubercle bacilli have shown no action upon anthrax spores.

For the disinfection of tubercle bacilli, carbolic acid and especially preparations from the tars are shown to be suitable; even wood tar in one experiment destroyed tubercle bacilli, and still more remarkable was the action of the mixture of sulphuric acid and carbolic acid, of creolin, and of cresolin which have destroyed tubercle bacilli with spores in all the experiments; creolin and cresolin accomplishing this even in two per cent. solutions. For the destruction of the infection of tuberculosis, therefore, a preparation derived from the tars should have the preference. For this purpose, crude carbolic acid, with the addition of hydrochloric or sulphuric acid, deserves a place near a 3 to 5 per cent. solution of pure carbolic acid.

The choice of disinfectants is to be made, not only with reference to the power of resistance of the infection to be destroyed, but also

*Arbeiten aus dem kaiserl. Gesundheitsamte V., 247. 1889.

with reference to the character of the objects to be disinfected, as for instance chloride of lime and the mineral acids are unsuitable for disinfecting articles made of iron on account of rusting them. Articles of this nature are preferably disinfected with heat, and when this cannot be done, painting with tar is to be recommended.

DISINFECTION WITH STEAM.

Much fertility of invention has been shown in the devising of apparatuses for disinfection through the agency of heat, some using for this purpose hot air, and some using steam. In England particularly, hot air as a disinfecting agent has been used considerably, but it has gradually been learned that, as compared with steam, it is much less certain and much less rapid in its action, especially when in practical disinfection bulky articles like mattresses must be penetrated and permeated by the heat.

Dr. Parsons* made an extensive examination of disinfecting apparatuses for the Local Government Board of England and, together with the expression of his preference for steam, gives the following as the most important requisites of a good apparatus for disinfecting by heat:

(a) That the temperature in the interior shall be uniformly distributed; (b) that it shall be capable of being maintained constant for the time during which the operation extends; and (c) that there shall be some trustworthy indication as to the actual temperature of the interior at any given moment. Unless these conditions be fulfilled, there is risk, on the one hand, that articles exposed to heat may be scorched, or on the other hand that, through anxiety to avoid such an accident, the opposite error may be incurred, and that the articles may not be sufficiently heated to ensure their disinfection.

In steam apparatus the three requirements above mentioned are all satisfactorily met, and for this reason, as well as on account of the greater rapidity and certainty of action of steam, steam chambers are in my opinion, greatly preferable to those in which dry heat is employed.

As early as 1862 our eminent sanitarian, Dr. A. N. Bell, at that time surgeon in the U. S. Navy, suggested the use of steam for the disinfection of ships infected with yellow fever, and his recommendations were carried out with successful results. In reporting his experiences that year to the Medical Society of the State of New York he formulated the following conclusions:

That inasmuch as a temperature of 145° Fahrenheit, which coagulates albumen, * * * * effectually disinfects the

*Rpt. of the Med. Officer of the Local Govt. Board for 1884, p. 302.

worst fomites, we have in this fact alone strong evidence of the identity of virus with organic matter.

That the necessary degree of heat for disinfection may be applied in some form to almost every article of commerce or apparel liable to the virus of infection or contagion, without injury.

That the examples furnished are an amply sufficient guide for the application of heat under the most variable circumstances.*

In the application of steam to disinfection, steam under various conditions has been used: steam at rest but under pressure, steam not under pressure and flowing in a free current through the goods to be disinfected, steam superheated but not under pressure, and mixtures of steam with hot air. The following extracts from the recent literature of steam disinfection will serve to show the drift of opinion in regard to the kind of steam to be employed, as well as some points to be observed in the construction of disinfectors.

As regards the efficacy of steam under pressure there seems to be no question, but there are certain points of disadvantage which render the general use of steam under pressure impossible in many places where the advantages of disinfection with steam are often needed.

Steam under pressure, to guard against the dangers of explosion, requires greatly increased strength of construction of both the steam generator and the disinfecting chamber, and this necessitates comparatively high cost of manufacture, thus effectually placing disinfectors of this sort outside the means at the disposal of most sanitary authorities and many public institutions not well endowed.

In addition to the first cost, apparatus for the use of steam under pressure requires the constant attendance of skilled help in running it, otherwise the increase in cost of construction would be no protection against accidental explosions; this of course entails extra cost in the operation of it.

These disadvantages appear to be overcome by the employment of steam not under pressure.

DISINFECTION WITH FLOWING STEAM.

In the report for 1887 of the Committee on Disinfectants appointed by the American Public Health Association we find the following:

*Trans. of the Ninth Internat. Med. Congress, IV. 568.

†Disinfection and Disinfectants, p. 208.

By referring to the report of the committee for 1886, it will be seen that the most efficient devices for disinfection by heat consist of those in which steam under pressure, or passing through the articles to be disinfected in a free current (strömender Wasserdampf) are employed. The opinion was expressed, based upon practical experience, that steam under pressure, in order to raise its temperature (or possibly to increase its penetrating power,) was the best form in which to employ the agent. This opinion was justified by European experience, and especially by the personal observations of Drs. S. H. Durgin and Joseph Holt, members of the committee, to whose reports attention is directed.

Recent experience abroad seems to indicate, however, that an apparatus in which the steam is not confined under pressure may be equally efficient, more easily managed, and much more economical.

One of the first apparatuses for using steam in a free current for disinfecting purposes was Henneberg's disinfector. One of these was placed in the Hygienic Institute in Berlin for a few weeks, and under the direction of Koch was tested by Dr. Esmarch.* The apparatus consists of an open top boiler, or kettle, upon which rests the disinfecting chamber, mouth downward. The steam, not under pressure, passes freely upward through the goods to be disinfected and escapes from the top of the chamber. In these experiments Esmarch was struck with the rapidity with which the steam penetrated the interior of clothing and even into the center of rolls and packages of goods so as to bring the temperature up to 100° C. His conclusions were that steam not under pressure at a temperature of 100° C., when it streams rapidly through the goods is well suited to be used as a certain and comparatively rapid acting disinfecting agent.

The Henneberg disinfector corresponds to the requirements of a good disinfecting apparatus and may be further recommended on account of its cheapness and the simplicity of its working.

In testing this apparatus all the micro-organisms found in the soil were not destroyed with certainty, and Esmarch questioned whether it is necessary to set the requirements of steam disinfection so high, since anthrax spores and tubercle bacilli, the most resistant of pathogenic germs known, were destroyed within a few minutes by flowing steam. All other bacteria which are known as the cause of human or animal diseases, the bacillus of cholera, of typhoid, and of glanders, the micrococcus of suppuration and of erysipelas, as well as the bacteria found by Friedländer and Fränkel in pneumonia, and by Loeffler in diphtheria, are all destroyed before the temperature reaches 100° C.

*Zeitschrift für Hygiene, IV., 342. 1887.

Dr. Loeffler,* as a member of the committee on disinfection before the International Hygienic Congress at Vienna, said:

Practically the requirement does not now exist to kill all spores, but only the infectious germs. The spores of the bacillus of tuberculosis are killed in half an hour, and those of anthrax in a few minutes, by steam at a temperature of 100° C. More resistant pathogenic germs than these we do not know. When objects in all their parts are subjected for half an hour to steam at a temperature of 100° C. (212° F.) the disinfection is completed.

In another paper Esmarch† gives the results of his investigations as to the comparative activity for disinfecting purposes of simple flowing steam not under pressure, and the same superheated. He found that, as the temperature of the steam was raised, within certain limits, its disinfecting power was diminished. Thus anthrax spores were killed with certainty with simple flowing steam at 100° C. (212° F.), but they were not destroyed by superheated steam at 110°, 120°, and 150° C. In another series of experiments, anthrax spores were killed with flowing steam at 100° C. in five and ten minutes, but with steam at 110° and 120° C. they were not destroyed in twenty minutes. Only as the temperature approached 150° C. (302° F.) did the disinfecting power of the steam increase again, and at 150° C. anthrax spores were killed in ten minutes. Esmarch could account for the failure of superheated steam to destroy anthrax spores only by supposing that bacteria are surrounded with an organic covering which protects them to some extent against the action of heat until it is softened or penetrated by moisture, and, as the superheated steam is dry steam, this fact accounts for its failure to destroy the spores of anthrax.

Prof. Gruber‡ of Vienna tested a Thursfield disinfector of the old pattern, and a later one of the new pattern. In the old apparatus, steam flowing in a free current through the goods, together with an admixture of hot air, was made use of. The results of Gruber's tests of it were unsatisfactory. The mixture of steam and heated air did not penetrate the objects to be disinfected readily, and the action was much inferior to the simple steam flowing in a free current.

In the new disinfector, steam alone is admitted into the disinfecting chamber, and Gruber found the working of the apparatus, very satisfactory. He says that it is not necessary, in disinfection with steam, to use a higher temperature than 100° C. (212° F.) and

*Viert. für öffent. Gesundheitspflege, XX., 236. 1888.

†Zeitschrift für Hygiene IV., 7. 1888.

‡Gesundheits-Ingenieur XI., 282. 1888.

that the knowledge is not unimportant, that, for the rapid penetration of the heat into the interior of objects, the steam should be as pure as possible, that is free from admixture with air.

Gruber also advises strongly the admission of the steam into the top of the disinfecting chamber and its escape from the lower part, thus passing the steam downward through the goods instead of upward as in most of the steam disinfectors. His reason for this recommendation is that air at the temperature of 100° C. has nearly twice the specific gravity of steam at the same temperature, and therefore, by the admission of the steam into the upper part of the disinfecting chamber, the air is more readily and quickly pressed downward out of the interstices of the goods and out of the disinfecting chamber.

On account of the prevalence of diphtheria in Copenhagen and the need of more efficient methods of disinfection, the city government charged Drs. Salomonsen and Levison* with the testing of various disinfecting apparatuses to determine their comparative efficiency. Five different disinfectors were tried. The results were as follows:

"We had successful results only with Reck's two disinfectors and with Geneste, Herscher & Co's apparatus." (The Reck disinfector employs steam moving in free currents and not under pressure, the steam entering the upper part of the chamber. It is recommended by the royal Danish health authorities. The Geneste, Herscher & Co's disinfector is a French apparatus using steam under pressure. A. G. Y.)

The French apparatus has one weak spot which we did not find in the Reck apparatus: the atmospheric air must necessarily be wholly expelled from the cylinder in order that rapid and complete destruction of the bacteria can be accomplished with the Geneste-Herscher apparatus. The carrying out of the disinfection with the apparatus is moreover more complicated, and the operation must be more closely watched than is necessary with Reck's disinfector, in which the expelling of the air goes on automatically as in all the disinfectors which use streaming steam, (*strömender Wasserdampfe*).

Dr. Budde† of Copenhagen takes a rapid view of the different kinds of steam disinfectors that have been put upon the market and speaks of the unsuitability of most of them for smaller towns, rural communities, small hospitals, alms-houses, prisons, etc.

If the use of steam disinfectors is to become generally extended in such places the first requirement will be that they shall be much

*Zeitschrift für Hygiene, IV., 94. 1888.

†Zeitschrift für Hygiene VII., 270. 1889.

less costly than hitherto without any diminution of their effectiveness. He hereupon goes on to describe a new disinfector made under his direction. The steam is generated in an iron wash boiler fitted with a cover, is conducted through a hose into the upper part of the disinfecting chamber and passes in a free current through the goods to be disinfected from above downward. The steam is under very slight, almost insignificant pressure.

The results obtained in the use of this disinfector are interesting and somewhat surprising. In all the experiments a maximal thermometer and an electrical contact-thermometer were rolled and wrapped in a woolen blanket, and outside of this another blanket of the same kind was wrapped, and the whole packet tied with twine. In five experiments the signal from the contact-thermometer indicated in from 12 to 30 minutes that the temperature of 100° C. had been reached, and the temperatures shown by the maximal thermometer ranged from 104.1° to 105° C. The author writes of these results as follows:

The hypothesis that this phenomenon can be explained by an increase in the steam pressure is shown by the records of my experiments to be entirely untenable. In tests 1, 2, and 3, for example, where the degrees of temperature were 104 3°, 104.7° and 105° C., one must have, if the temperature were due to the tension of the steam, a pressure of about one-fifth atmosphere, while in reality the pressure, as the records of this experiment show, was only one-thirty-fifth atmosphere. The high degree of temperature cannot be explained by the pressure to which the steam is subjected, indeed there remains only one moment explanatory of it, namely, condensation of the steam.

In a later series of experiments with steam under moderate pressure, Budde found that flowing steam delivered with a pressure of fifteen pounds penetrated the interior of a roll of wrappings and raised the contract-thermometer to 100° C. in two and one-half minutes, while with steam at rest, but under the same pressure, eleven minutes were required, and with intermitting pressure, after the Geneste-Herscher method, five minutes were required to attain the same temperature.

Dr. Hahn* has recently described a new form of disinfector which he tested in the Hygienic Institute in Berlin, the Budenberg disinfector, which makes use of flowing steam, the steam passing downward instead of upward through the disinfecting chamber. This disinfector is intended for small towns. In some of the experiments

*Deutsche Med. Woch. XVI., 240. 1890.

the temperature indicated by the maximal thermometer was 105.5° C., and in one experiment with the steam in the disinfecting chamber under the pressure of .3 atmosphere, the maximal thermometer showed a temperature of 107° C. With this slight pressure, and in other experiments with none, anthrax spores and garden earth were completely sterilized.

Dr. Hahn presents the following points as the principal requirements in a disinfector of this kind:

1st. The apparatus must be capable of destroying all known pathogenic micro-organisms and their spores, even the most resistant anthrax spores.

2d. It must be capable of accomplishing these results in every part of the disinfecting chamber within a reasonable length of time, which varies of course with the size and character of the objects to be disinfected.

3d. The objects must not be injured in any marked degree.

4th. The apparatus must not be too complicated in its construction and must be easily operated.

Dr. Rohrbeck*, referring to the discrepancies in the results obtained by different investigators in the use of steam of different qualities for disinfecting purposes, says that "from all the investigations it is evident that the damp (gesättigte) steam is the principal agent in disinfection, while the non-saturated, dry (superheated) steam is not particularly better as a disinfectant than hot air."

As to the changes or injuries suffered by goods in the process of steam disinfection, Esmarch speaks as follows in reference to his trial of the Henneberg disinfector:

Among several hundred samples of woolen, silk, plush, and other goods of the most different colors, only a very few were changed after one to two hours disinfection, as light blue, pink, and white. The rest of the samples remained entirely unchanged not only in color, but also in luster and strength of texture. Linens were unchanged excepting in spots where they came in contact with the galvanized iron wire of the baskets in which they were placed, and this could be easily prevented by the interposition of a covering of cloth. Most samples of paper acquired a slightly yellowish tint and lost their gloss; the bindings of books were injured especially when in leather. Articles in leather and fur are spoiled in a short time so as to become worthless.

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*Centralblatt für Bak. u. Par., VI., 493. 1889.

DISINFECTORS FOR SMALL TOWNS.

Dr. C. N. Hewitt* in his presidential address before the Milwaukee meeting of the American Public Health Association, in enumerating the essentials for successful local sanitary work referred as follows to the need of a practicable steam disinfector for small towns and rural communities:

Another essential is an apparatus, not too expensive or elaborate, or too heavy for easy movement on wheels, for disinfecting clothing, bedding, and the like, by steam. One to which steam could be supplied by the boiler of a thresher engine would serve our country districts, and the same could be used where steam boilers are available elsewhere. It could be taken to the infected house, charged, closed, and moved to the nearest available boiler, connected, disinfected, and discharged of its contents, with no danger, and at trifling expense.

At the meeting of the German Public Health Association of 1887 the following resolutions with reference to steam disinfection and disinfecting establishments were passed:

Each large city should have one or more public disinfecting establishments. For the general use of the public in small towns, transportable disinfecting apparatuses are preferable.

The use of public disinfecting establishments should be available to the poor without pay when their need is certified by the attending physician.

For purposes of disinfecting "streaming steam" is preferable.

The choice of the apparatus, and the technical arrangement of it, will depend upon the local conditions.†

At a recent meeting of the Paris Academy of Medicine, M. Paul Gibier described a disinfecting stove he has recently invented. It can be taken to pieces, and moved into the infected room. The inventor aimed at preventing the diffusion of germs by removing infected articles to be disinfected. The stove is made of galvanized sheet-iron; outside it is covered with felt. It resembles Koch's sterilizing apparatus; like it, this stove sterilizes bedding, even a mattress by means of steam at 100° C. (212° F. Some exceptional microbes resist this temperature during a certain period of time, but it is rare to see them survive the influence of this degree of moist heat during three quarters of an hour, or at the most an hour. M. Gibier destroyed all the pathogenic microbes he had experimented on—the cholera bacillus, bacillus of typhoid fever, several kinds of micrococci, ferments, fungus of the aspergillus order, aspergillus fumigatus, the A. flavescens of dried blood, containing the microbe of symptomatic charbon. The smoke passes up the chimney of the room which is disinfected. The process of disin-

*Trans. American Public Health Association, Vol. XIV., 11. 1888.

†Uffelmann's Supplement, 1886, p. 141.

fection lasts one hour or more, according to the size of the stove, and this can be regulated. The stove is a system of segments, and, according to the number of segments utilized, the stove is smaller or larger. This stove is simple in construction and moderate in price, therefore would be of great use in hospitals and charitable institutions, as well as private houses.* (This disinfecting stove is figured in the last report of the Committee on Disinfectants appointed by the American Public Health Association.—A. G. Y.)

HYGIENIC VALUE OF SUNSHINE.

In the Brooklyn meeting of the American Public Health Association last fall Dr. Parker of Newport, R. I., read a paper on "The Overshading of Our Homes" in which he said:

Houses overshaded are not healthful, no matter how commodious or well built they may be. Too many trees near sleeping and living rooms exercise a very injurious influence and induce various diseases, notably rheumatism, heart disease, consumption, general debility, and anæmia. * * * * * The air entering the bedrooms and living rooms from such surroundings is chilly and dead, and is not at all suitable for respiration. Such an atmosphere cannot bring health to invalids, and is dangerous to the well. It is invariably productive of sickness and even death, especially among children and those of feeble constitution.

In a lecture on disinfection Sternberg† places light among those agencies which are capable of destroying disease-producing influences.

Among the germicide agents which have been tested I will first mention light. We have experiments by a number of different observers upon the germicide power of light, and it is a very interesting fact that exposure to the bright sunlight destroys pathogenic organisms, independent of the heat of the sun; experiments have been made to show this. Taking two tubes, one of which is enveloped in tinfoil to exclude the light, but which receives the heat in the same way as the other; in the one which is exposed to the bright sunlight the germs in certain cases are destroyed—in some instances in quite a short time. Duclaux found that certain micro-organisms are destroyed in twelve hours' time when exposed to the sun during June and July. He found that dry spores were destroyed in two months when exposed in a dry condition. These spores can be kept indefinitely when put in a dark place in a dry condition. Another observer, Arloing, found that the spores of anthrax in bouillon were killed in two hours; whereas the anthrax bacillus required from 27 to 30 hours. It was a strange fact that the anthrax bacilli which had grown out withstood the light longer than the spores. The explanation is supposed to be that the spore just at the moment of sprouting is more tender and more easily killed than

*Sanitary Record, VII, 558. 1886.

†Brooklyn Med. Journal, III., 341. 1889.

the bacilli after they are in full development and multiplying by binary division. He found by putting these same spores in water that they were not killed; it was only in a suitable culture medium that the light had this effect on them. By the electric light spores in bouillon were killed in one hour. This shows us that in sunlight we have a sanitary agent of great importance; a fact which has long been recognized by sanitarians, and now we have experimental data to support this well recognized fact.

Dr. Uffelmann,* in a thoughtful paper on "The Hygienic Significance of Sunlight," refers to the work of a large number of investigators who have clearly shown the healthful influence of direct sunlight upon the human and animal bodies. A marked increase in the excretion of carbonic acid and absorption of oxygen occurs as a result of the action of sunlight, and this is due partly to the direct chemical action of the light upon the surface of the body, and partly to a salutary reflex action from the retina. Upon the air, the light does an important work in purifying it from the organic matter present in it. On some disease germs, sunlight has a rapidly destructive action, upon others, among which is the typhoid bacillus, it does not. As yet is it too early to generalize.

Observation teaches that children especially suffer from a lack of natural light. Even the children of families in easy circumstances whose houses are otherwise healthful except that the direct sunlight has little or no access to the rooms, very frequently have but little freshness of color and a flabby muscular development, but when they are moved to well lighted rooms with a southerly exposure, they gradually improve. This I have so frequently observed in my former practice that I think it safe to say a causal relationship exists between the removal to better lighted rooms and the improvement in the appearance of the children. One disease of childhood is particularly related to the lack of sunshine, that is, scrofula. * * We shall not err, therefore, if we regard sunshine as one of the important factors for the maintenance of sound health and the absence of light as a debilitating influence.

Dr. Deichler† of Frankfort-on-the-Main is another recent writer on this important subject.

The rays of the sun falling on the skin have a direct and important influence upon the blood in the vascular system immediately beneath. * * * The epidermis permits the passage of warmth through it, that we feel; it also permits the passage of light

*Wiener Klinik, 3 Heft. 1889.

†Deutsche Medizinal-Zeitung, VIII., 285. 1887.

as is shown by the experiment of holding the hand in the night time before a clear light. We see then, by the beautiful blood red color of the finger, that the light penetrates through the comparatively thick skin of that part, and that this function of the light is an important one in the economy of the body. We see, in the skins of the naked inhabitants of the equatorial regions, the care which nature takes in interposing a protection against the penetration of too strong light. Upon the skin of the negro the light and warmth act simultaneously. The heat, on account of the dark color of the skin, is absorbed in a high degree, but notwithstanding this the colored man is not injured, for he sweats and is cooled thereby. The almost vertically falling rays of the sun, however, are moderated by the pigment layer and reach the blood with the intensity of their chemical action considerably moderated. Thanks to this dark hide the inhabitant of the torrid zone bears the excessive action of the sun without injury, while the white European endures with difficulty the tropical climate, and even his children are not acclimated.

Good food, a plentiful supply of air rich in oxygen, a certain amount of iron, all these are not sufficient for the building up of a healthy blood capable of withstanding the innumerable harmful influences of life; there is needed also the action of the light upon the surface of the body in order that it may exert its influence upon the blood.

M. Trelat* has written upon a subject which touches the faulty styles of draping windows which are in vogue, so as to diminish very much their value as sources of light for our houses. He reminds us, as the writers on school hygiene do, that for lighting and sunning rooms the upper part of the window is of greater value than the lower part, on account of the greater depth to which it permits the penetration of the rays of light into the room. He does not approve, therefore, of the prevailing style of covering the upper part of the window and leaving only the lower part open for the admission of light.

PURITY OF THE SEA AIR.

While those primal forces, light, chemical action, etc., are not to be ignored, it may be said that nature's principal means for purifying the atmosphere of those substances which render it less suitable for breathing, are the action of vegetation, the washing of the air

*Revue D'Hygiene VIII., 647. 1886.

by rain and other precipitation, and that constant process of sedimentation which goes on when matter of a higher specific gravity is suspended in gases or fluids of a lesser. As regards the first of these forces it is common knowledge that a reciprocal action goes on between plants on the one hand as consumers of carbonic acid, and those natural and artificial processes of combustion which deliver carbonic acid in large quantities to the atmosphere. It is also a matter of common observation that a shower often has a remarkable effect in clearing the air of smoke or other matter which diminishes its transparency, and the exclamation, "How pure the air is!" is not amiss, for science confirms the assumption. For instance, Tissandier found that in a given quantity of air from one of the parks in the city of Paris, there were fifteen milligrams of foreign matter in the form of dust before a rain and only six milligrams after a rain had fallen. In the country, in a dry time, there were from 3 to 4 5 milligrams of dust, and after a rain only .25 milligrams.

Few persons, however, have an idea of the part played by sedimentation in the purification of the air. It is true that fine particles of solid matter, caught up by the wind may be transported long distances by the stronger currents of the atmosphere, and thus the microscope often shows in the atmospheric dust, particles of matter foreign to the places in which they are found, but it is nevertheless true that, on account of their greatly superior specific gravity, these solid particles, organic and inorganic, have a tendency to settle with comparative rapidity. Among the smallest of the solid contents of the atmosphere are the bacteria, and the rapidity with which their numbers in the air are diminished as we proceed from land to the open sea, has been shown, or rather re-shown, by some comparatively recent experimental work.

Professor Uffelmann,* in the Hygienic Institute in the city of Rostock, made for more than a year, careful observations chemical and bacteriological upon the character of the air in and around that city. The average of 420 determinations of the quantity of carbonic acid in the air of the city was 3.51 parts per 10,000, and the average of 26 observations on the free air outside the city was 3.18 per 10,000. Further, the quantity of carbonic acid was greater when the wind blew from the land than when it came from the sea.

*Archiv für Hygiene, VIII., 262. 1888.

As regards the amount of organic matter in the air, the figures representing the averages were, 3.70 for the city, 2.71 for the free fields, and .80 for the seacoast. (Rostock is on a river about nine miles from the sea.)

The number of bacteria present in the air varied much, but their average was, in the yard of the university, 450 per cubic meter; in the free fields, 250; on the seacoast, 100. The number of bacteria was diminished by sea breezes, and increased when the wind was from the land. Protracted rains diminished their numbers in a marked degree, but did not cause all to disappear.

Dr. Fischer*, a German naval surgeon, while crossing the Atlantic to the West Indies, carried on a long series of investigations in regard to the germ contents of the atmosphere. In fourteen of his tests, aspirating each time on the average 113 liters of air, not a single germ was found, and in 2,978 liters of aspirated air only the small aggregate of 68 germs was found. In twelve experiments which were made at a distance of at least, 120 nautical miles from land, the air was shown to be entirely free from germs. The number of bacteria found in the different observations varied much with the distance from land and with the direction of the wind. Thus, as regards the proximity to land, in the outward voyage, on the German ocean, one germ: in the English channel, eleven; near Plymouth, one mile from land, nine; and then as they sailed out to sea, the next two observations showed no germs, and the next but one.

Miquel has also studied the ocean air bacteriologically, and at a distance from the coast has found it almost completely free from germs, and in air taken at the distance of 100 kilometers (62 miles) from shore it was absolutely pure. Therefore, he says that "the sea is the grave of all the bacteria of the atmosphere, indeed, the sea air, as it blows over the land, purifies the atmosphere lying above it. The air of the ship's cabin is decidedly richer in bacteria than that of the sea, but on the voyage, from day to day it becomes purer the farther the ship sails from the coast. Under all circumstances the cabin air contains a decidedly smaller number of organic germs than the air of our dwellings."

*Zeitschrift für Hygiene I., 421. 1886.

COUNTRY AIR AND SEA AIR FOR SICK CHILDREN.

One of the best of the humanitarian movements of the time is that which seeks to take poor sick children from the unhealthful surroundings of their crowded city life out into the pure air of the country for a few weeks in the summer. In this work we are not alone. Two years ago an International Congress met in Zurich for the purpose of discussing the various aspects of this beneficent movement, and it was attended by delegates from almost every European country, even from comparatively remote Russia and Spain. Some of the speakers gave facts and figures which show the beneficial influence of such outings. Thus the average gain in weight in the different colonies, or stations was from two to six or eight pounds, with a corresponding increase in appetite, muscular strength, and richness of the blood in red corpuscles.

That the good results derived from these three to six weeks holidays in the country, were due in great measure to the salutary influences of country air and sunshine, and not wholly to better food, is shown on the one hand by the fact that the gain exceeded very much the gain of the children from the same cities and the same classes, who were sent for their health to the milk cure establishments in the city, instead of going to the country, and on the other hand by the fact that children who carried their own provisions to the "colonies" made also a marked improvement. The children of some of these colonies were kept under observation after their return home, and in Breslau and Stüttgart, the periodical weighings were kept up for nine months and indicated that the start given in the improvement of the physical condition is often a permanent gain.*

This movement for curing puny children by sending them to the country, to the mountains, or to the seaside, is not by any means new. Nearly a hundred years ago a seaside hospital for sick children was opened at the English watering-place, Margate, and has been successively enlarged and improved. France has a large marine hospital at Berck-sur-Mer with beds for more than 700 children. Many other countries have seaside hospitals for children, some for permanent occupancy, some for summer colonies only. Italy, however, leads in this good work, with nine of these seaside asylums on the Mediterranean, and six on the Adriatic coast, devoted principally

*Verhand. des Internat. Kong. für Ferienkolonien, p. 10. 1888.

to the cure of scrofulous children. An interesting account of the work done in these Italian seaside hospitals, as well as those in Europe generally, is given by Dr. Badaloni,* in a paper entitled "Scrofula and the Sea." The records of these hospitals or health stations show that they are remarkably successful in their work. In these Italian seaside hospitals, the treatment of scrofula is successful in 92.8 per cent. of the cases, and unsuccessful in 7.2 per cent. A French surgeon is quoted as saying, "The ocean, without the scalpel cures a great number of scrofulous leisons: the scapel without the sea, cures only a limited number; together they mutually aid each other and cure cases the most severe and the most inveterate."

SUMMER DISEASES OF CHILDREN.

Considerable difference of opinion has prevailed as to the more potent causes of the summer diarrhœal diseases of children. It is matter of common observation that the greatest prevalence of these disorders occurs during the warm season, therefore it is easy to jump to the conclusion that they are caused by the direct action of the heat on the bodies of the children. As the temperature characteristics of our climate, excepting on a small scale within our dwellings, are entirely beyond our control, this conclusion leads to very pessimistic views as to preventability. It is a common remark among physicians that the great majority of cases of the diarrhœal diseases of children occur in bottle-fed babies. Observations of this kind suggest a difference unfavorable to the babies between the artificial food and healthy mother's milk. Another fact is known to be true: that the diarrhœal diseases of children are much more prevalent in cities than in the country. In explanation of this, various untoward conditions of city child life suggest themselves, among which are the inferior quality of the milk supply, the want of ventilation and the heated air of tenement blocks which absorb the heat of the day and radiate it into the tenements at night.

Dr. Seibert† of New York, made a painstaking comparison of the statistics for ten years of summer-complaint in that city with the meteorological records, examining every summer month for the ten years, and every batch of days in them. He could find no relation whatever between the barometric figures, humidity, rainfall, and velo-

*Giornale della Reale Soc. Ital. D'Igiene XI., 163. 1889.

†Medical Record, XXIII., 317. 1888.

city of air currents on the one hand, and the prevalence of summer-complaint on the other. As regards temperature, he shows that the greatest prevalence of this disease does not fall with the hotest days, but corresponds closely with the warmest nights, or in other words the maintenance of the temperature above a given minimum has more influence than the summer maxima of heat. He concludes his paper with the following statements:

1. Hot weather (either dry or moist) is not necessary for the epidemic appearance of summer-complaint.

2. Warm weather (either dry or moist) showing minimum daily temperatures of not less than 60° F., brings on the epidemic appearance of cholera infantum invariably in every year, irrespective of the height of the maximal daily temperature, as in the latter part of June of nearly every year.

3. Summer-complaint loses its epidemic character as soon as the minimal daily temperature remains below 60° F., as in the latter half of October of nearly every year.

4. Therefore, this disease cannot be brought about by the direct working of high temperatures on the infantile body, but must have other causes.

What may these causes be? Let me suggest one of them. The lowest temperature of each day in summer is at night; the milk feeding our children is brought to the city during the night, shaken and jolted in cars and wagons, absorbing impurities from the time it leaves the cow until it enters the mouth of the child; thus, the conditions for decomposition are given in every instance, without exception. The only question remaining is: How far is your New York City milk advanced in decomposition when you get it? Now we know that low temperature retards putrefaction and decomposition of any animal or vegetable substance, and that higher temperature aids it, and especially milk. My only explanation for the so much higher morbidity and mortality of July over August is, that it takes a few weeks of high morbidity and mortality every year to fully arouse the public, and especially the poorer classes, to the dangers threatening their children, and to impress upon the parent's minds the very simplest fundamental principles of how to avoid them—a beginning of which was made by the distribution of the rules of how to handle milk and babies, written by the President of this Academy about fifteen years ago.

In a discussion which has lately been held by the New York Academy of Medicine, the remarks by some of the speakers give an idea of the present prevailing medical opinion as to the causation of the diarrhœal diseases of infancy.

Dr. Caillé* said that most all cases of infantile diarrhœa were due either to improper feeding or improper food.

*Archives of Pediatrics VII., 219. 1890.

As an illustration of the former he cited overfeeding at the breast; as an illustration of the latter, spoiled food in bottles and unhealthy breast-milk.

In severe diarrhœa, in city practice, milk should be at once interdicted and mucilaginous and farinaceous drinks given. As soon as the patient is better we should teach the guardians of a bottle-fed child how to prepare a good bottle food.

As cows' milk is the basis of infants' food we need not rely upon any kind of patent food. We select good milk, dilute the same with one or two parts of water or barley-water, and add sugar, salt, and lime-water. The addition of cream is unnecessary if the cows' milk is sufficiently rich in fat.

Such a food if sterilized or steamed in small bottles, is a good imitation of nature's food, and forms a good tissue-builder for the developing child. Where the digestive apparatus is defective, through long-standing disease, we give our patient a predigested milk, easily prepared with the peptogenic milk-powder of the shops. At the present state of our knowledge the formula for infant dietetics is very simple, and there should be no diversity of professional opinion on so important a subject.

In the same discussion Dr. Baruch spoke as follows:

I believe that in the rigid exclusion of micro-organisms from the milk which nourishes them lies the safety of our infants. We know that breast-milk is sterile in the breast; we know also that cows' milk is sterile in the udder. We know that breast-fed children die of summer diarrhœa only in proportion of three to one hundred artificially fed (Meinert of Dresden, and Hope of Liverpool, have given these ample statistics). We know, therefore, that artificial feeding is the predominating element in the etiology of these diseases; we know, also, that they are so rare in winter that the title summer diarrhœa has been unanimously recognized as a correct designation. It follows as a logical deduction that there is some causative connection between the high temperature and artificial feeding. Soxhlet, I hold, is the Semmelweiss of this question. He has shown us that milk curdles three hundred and thirty times faster in a temperature of 98° F. than at 58° F. This, taken in connection with Pasteur's discovery, made forty years before, that the curdling of milk is due to a bacterium lactis, clears up the subject wonderfully.

STERILIZED MILK.

Dr. Soxhlet, a German physician, proceeding on the assumption that the summer diarrhœas of children are caused principally by changes in the milk due to the presence of bacteria and the poisons which these micro-organisms generate, conceived and put in practice the idea of "sterilizing" milk for the use of children. To sterilize milk is simply to destroy the life of the micro-organisms in it by the aid of heat. After full sterilization is accomplished, the milk

will remain without souring or other change, providing the access of bacteria from the air or other sources be guarded against, and this may be accomplished by tightly fitting (sterilized) stoppers or by plugging the bottles with cotton. When cotton is used it does not, of course, exclude the air, but it arrests and strains out the solid particles which may be suspended in the air, including bacteria.

This is only another use of the well known principles applied in our multiform industries of canning. Since the use of sterilized milk was suggested by Soxhlet a few years ago, the worth of the suggestion has been abundantly confirmed in private and public practice, though it has not yet been adopted so generally as it seems to deserve.

Warner* recommends a domestic apparatus for the sterilization of milk. It consists of an ordinary cooking-steamer, which is filled to the height of two inches with water, which is brought to the boiling point; the milk, which is the infants' allowance for the next twenty-four hours, is placed in as many nursing-bottles as are employed during that period of time. These bottles, having been previously placed in an oven for fifteen minutes, are now stoppered with pledgets of cotton and put on the perforated plate of the steamer, not touching each other, the cover shut tightly down, and the whole allowed to steam for thirty minutes. Dr. Warner found milk to remain pure for five weeks after being sterilized as above. This, indeed, seems to be very practicable for mothers or nurses.

For the sterilization of milk on a larger scale, or for transportation, various patterns of bottles with self-sealing stoppers are now made, and an apparatus might be used for sterilizing with "flowing steam" something like some of the steam disinfectors that have been mentioned on preceding pages; or just as efficient would be a sterilizing chamber made like a large steam cooker (or cooking steamer) to set upon the kitchen stove or other heater.

FURTHER NOTES ON INFANT FEEDING.

All writers on the subject unite in condemning in strong terms the nursing bottle with the long flexible tube. This apparatus cannot be thoroughly cleaned, and the interior of the long rubber tube is a focus for the infection with the germs of fermentation of all the milk passing through it. A simple rubber nipple, slipped over the mouth of the bottle should be used.

*An. Univ. Med. Sciences, for 1889, II., K-21.

Dr. Rotch,* Assistant Professor of Diseases of Children, Harvard University, gives the following useful tabulation of rules for the artificial feeding of infants:

Age.	Intervals of feeding.	Number of feedings in 24 hours.	Average amount at each feeding	Average amount in 24 hours.
1st week........	2 hours.	10	1 ounce.	10 ounces.
1-6 weeks.......	2½ hours.	8	1½ to 2 ounces.	12 to 16 ounces.
6-12 weeks, and possibly to 5th or 6th month	3 hours.	6	3 to 4 ounces.	18 to 24 ounces.
At 6 months.....	3 hours.	6	6 ounces.	36 ounces.
At 10 months....	3 hours.	5	8 ounces.	40 ounces.

Dr. Starr,† in his excellent little work, gives the following general directions concerning the preparation of infant foods:

The object to be accomplished in the preparation of cows' milk is to make it resemble human milk as much as possible in chemical composition and physical properties. To do this, it is necessary to reduce the proportion of caseine, to increase the proportion of fat and sugar, and to overcome the tendency of the caseine to coagulate into large, firm masses upon entering the stomach.

Dilution with water is all that need be done to reduce the amount of caseine to the proper level; but as this diminishes the already insufficient fat and sugar, it is essential to add these materials to the mixture of milk and water. Fat is best added in the form of cream, and of the sugars, either pure white loaf sugar or sugar of milk may be used. The latter is greatly preferable, as it is little apt to ferment, and contains some of the salts of milk, which are of nutritive value.

Firm clotting may be prevented by the addition of an alkali or a small quantity of some thickening substance, as barley water, gelatine, or one of the digestible prepared foods.

Lime water is the alkali usually selected. It acts by partially neutralizing the acid of the gastric juice, so that the caseine is coagulated gradually and in small masses, or passes, in great part unchanged, into the intestines to be there digested, by the alkaline secretions. As it contains only a half a grain of lime to the fluid ounce, the desired result cannot be attained, unless at least a third part of the milk mixture be lime water. The quantity often used—one or two teaspoonfuls to the bottle of food—has no effect beyond neutralizing the natural acidity of the milk itself. When lime water is constantly employed, it becomes quite an item of expense if procured from the drug shop; this outlay is unnecessary, for it

*Arch. of Pediatrics, IV., 465. 1887.

†Hygiene of the Nursery, p. 137.

can be made quite as well in the nursery. Take a piece of unslaked lime as large as a walnut, drop it into two quarts of filtered water contained in an earthern vessel, stir thoroughly, allow to settle, and use only from the top, replacing the water and stirring as consumed.

Dr. Rotch* in seeking a suitable artificial infant food has shown by chemical analyses that the following mixture recommended by Dr. Meigs, corresponds very closely in its chemical composition to that of human milk:

Cream	2 parts.
Cows' milk	1 part.
Lime water	2 parts.
Sugar water	3 parts.
Total	8 parts.

The cream should contain from 14 to 16 per cent. of fat. "To avoid the necessity of having the cream analyzed, cream made by the centrifugal process can be used, for this has a per cent. which varies very little from thirty-two, so that by diluting this cream with water one-half we have a cream with a per cent. of about 16, which is what is usually needed for the average infant digestion." The sugar water consists of 17¾ drachms of milk sugar dissolved in one pint of water.

From an extended schedule to guide parents in the dietary of infants from birth upward given by Dr. Starr in the work to which reference has already been made, I extract only the following:

Diet during the first week:—

Cream	2 teaspoonfuls.
Whey	3 "
Water (hot)	3 "
Milk sugar	¼ teaspoonful.

For each portion; to be given every two hours from 5 A. M. to 11 P. M., and in some cases once or twice at night, amounting to twelve fluid ounces of food per diem.

Diet from the second to the sixth week:—

Milk	1 tablespoonful.
Cream	2 teaspoonfuls.
Milk sugar	¼ teaspoonful.
Water	2 tablespoonfuls.

*Op. cit.

For one portion; to be given every two hours from 5 A. M. to 11 P. M.; amounting to seventeen fluid ounces of food per diem:—

Diet from the sixth week to the end of the second month—:

Milk........................	2½ tablespoonfuls.
Cream......................	1 tablespoonful.
Milk sugar....................	½ teaspoonful.
Water........................	2½ tablespoonfuls.

For each portion; to be given every two hours, amounting to thirty fluid ounces per diem.

Diet from the beginning of the third month to the sixth month:—

Milk	5 tablespoonfuls.
Cream........................	1 tablespoonful.
Milk sugar....................	1 teaspoonful.
Water	2 tablespoonfuls.

For each portion; to be given every two and a half hours, or thirty-two fluid ounces per diem.

THE IMPORTANCE OF A PURE MILK SUPPLY.

Dr. Cyrus Edson* of New York, read a paper before the Ninth International Medical Congress beginning with these words:

From a sanitary standpoint the milk supply of cities is second only in importance to the water supply. The most vulnerable portion of the community to the attacks of disease are the children.

To protect these is the health officer's first duty. Children are, of necessity, subjected to influences in large cities that tend to depress and lower their vitality. It is, therefore, of the highest importance that they should receive plenty of nourishing food.

Milk is the chief food of children. No article of food is so liable to be adulterated or charged with noxious matter. The peculiar physical properties of milk make it easy for the unscrupulous to tamper with it for his own selfish ends and it readily conceals within its opaque body disease-producing material with which it may be accidentally charged.

On the same occasion Dr. Vaughan† gave the following rules concerning the care necessary to prevent milk undergoing putrefactive changes:

1. The cows should be healthy, and the milk of any animal which seems indisposed should not be mixed with that from perfectly healthy animals.
2. Cows must not be fed upon swill, or the refuse of breweries, or glucose factories, or upon any other fermented food.

*Tr. Ninth Int. Med. Congress, Vol. III., p. 477.

†Ibid, p. 486.

3. Cows must not be allowed to drink stagnant water, but must have access to pure, fresh water.

4. Cows must not be heated or worried before being milked.

5. The pasture must be free from noxious weeds, and the barn and yard must be kept clean.

6. The udders should be washed, then wiped dry before each milking.

7. The milk must at once be thoroughly cooled. This is best done in the summer by placing the milk can in a tank of cold spring water, or ice water, the water being of the same depth as the milk in the can. It would be well if the water in the tank could be kept flowing, indeed, this will be necessary, unless ice water is used. The tank should be thoroughly cleaned every day to prevent bad odor. The can should remain uncovered during the cooling, and the milk should be gently stirred. The temperature should be reduced to 60° F. within an hour. The can should remain in the cold water until ready for delivery.

8. In summer, when ready for delivery, the top should be placed on the can and a cloth wet with cold water should be spread over the can, or refrigerator cans may be used. At no season should the milk be frozen, but no buyer should receive milk which has a temperature higher than 65° F.

9. After the milk has been received by the consumer, it should be kept in a perfectly clean place, free from dust, and at a temperature not exceeding 60° F. Milk should not be allowed to stand uncovered even for a short time in the living or sleeping rooms. In many of the better houses in the country and villages, and occasionally in the cities, the drain from the refrigerator leads into a cesspool or kitchen drain. This is highly dangerous; there should be no connection whatever between the refrigerator and any receptacle of filth.

10. The only vessels in which milk should be kept are in glass or porcelain. After using the vessel, it should be scalded, and then, if possible, exposed to the air.

When these rules are put into operation, milk can be preserved free from putrefactive changes for a reasonable length of time, and it will remain fresh and palatable. When such care is not exercised, the milk may become, as we have seen, highly poisonous within a few hours after it is drawn from the cow. When we take into consideration the fact that many children must feed exclusively or largely upon this milk, we certainly cannot regard the time and expense which the above rules demand as of great moment.

At the meeting of the American Medical Association, two years ago, Dr. Wood*, Chairman of the section on Dietetics and Diseases of Children, made the following remarks:

There are two classes of people that need looking after: the first is the vendor of unwholesome milk. This class must be taken in charge by the strong arm of the law. Milk kept in foul vessels, watered milk, adulterated milk, and milk from wretched cows

*Sanitarian XXI., 97. 1888.

chained up all their miserable lives in dark stables and fed on brewery slops, slay annually thousands and thousands of helpless babes in our cities. Such milk is unfit for any purpose, and it should be kept out of the market. Those who vend such milk are deliberate murderers, and they should meet with the punishment commensurate with their cowardly crime. The other class consists of the mothers and nurses who will persist in over-feeding babes, dreading starvation, ignoring the fact that babes, need water, not milk, when fretful and feverish from indigestion. The crime of this class is ignorance, and they must be educated out of their pernicious practice. Thousands of children may be saved by lessening the amount of food during the heated term.

Arsenic in Wall Paper.

By F. C. Robinson, Member of the Board. Professor of Chemistry, Bowdoin College.

It is now many years since the attention of physicians and chemists, and through them of the public generally, was called to the fact that arsenic was largely used in the manufacture of wall paper, and that numerous cases of dangerous, if not fatal poisoning had resulted therefrom. These statements were at first denied by dealers and manufacturers of room papers. They could not deny that arsenic was present in such papers, especially in the green colored samples, but they denied most strenuously that poisoning could result therefrom unless the paper was actually taken into the mouth. Doubtless they were sincere in their denials, but it was another case of believing easily what one wants to. At this late day all doubt is removed, especially as concerning those old Paris-green papers, and they are rarely seen in the wall papers now sold. Case after case of their evil influence has been most positively identified, not only by the well known symptoms of arsenical poisoning developed in persons occupying such papered rooms, but the arsenic has been actually obtained from their urine, and to make the chain of evidence complete, both the symptoms and the arsenic have disappeared upon removing the patient or the paper from the room.

It is thus of no use for anyone to contend that the use of arsenic in making wall papers is not a source of danger; and the practical question for us here in Maine to-day is, what is our condition with reference to the matter? One thing is certain, however, and that is that even if poisonous papers are sold within our borders we have at present no redress. It is not at all against the law. We may be "ground down" by the "sumptuary law" which forbids a man from selling us rum to poison us or our children, as some think we are

but one may with impunity sell us paper loaded with Paris green, which will more surely destroy the health or lives of ourselves or children. No officer can say him nay. But are such papers being actually sold in Maine to-day, and, if so, how can we recognize and avoid them? It was to answer and if possible settle this question that I began investigating the matter the present winter, at the instance of the State Board of Health. The investigation is not yet completed to my satisfaction, and so this report is only a preliminary one. It seemed best however to state at this time the results already found, and the general condition of the subject, and to continue the matter in some future publication. It is hoped too that the spreading of the fact that such work is being done will serve to call the attention of physicians and others to the matter, and bring in cases and samples of papers which could not otherwise be obtained. And I take this opportunity to invite the cooperation of all in this most important matter, to the health of the State.

My first work was to collect samples from different quarters of the State, and by the aid of the local health boards in Bangor, Calais, Portland and Brunswick, I soon received several hundred samples, obtained from the dealers in those cities. And I wish to say here that I found a ready wish expressed by all dealers I came in contact with, to give all aid in their power to my investigation. Of course examination of such samples would not represent the actual condition of rooms in Maine, for they were taken from the new stock of the dealers, but by this time, many of them are probably on rooms, and their examination will tend to answer one part of the question, at least, and a very important one, as to the character of the papers being now offered for sale in the State. Upwards of one hundred of these samples have now been examined for arsenic and it is gratifying to be able to state that the vast majority of these are free from the poison or contain but the merest trace. In fact but three only have been found which are unmistakably dangerous But while this number is so gratifyingly small, one of them is so typical of what has been sold so largely in the past, and so dangerous in its nature, that if my investigation had succeeded only in finding it I should have regarded it as a most profitable work. It happens, too, that the paper in question was not simply obtained in sample from a dealer but was used upon two rooms within my knowledge, and in one case caused the serious illness of children occupying the room. I am glad to say, however, that it was not a paper made in this

country but imported from England, being too poisonous for sale there it was sent like a "forced emigrant" to do its deadly work upon our shores. It was a landscape paper made for pleasing children, representing a scene in the grape region, and the bright green grape vines and purple clusters of grapes and gay-colored clothes of the workers made truly a pleasing sight.

Temperance people will perhaps regard it as very appropriate that such scenes should be represented in poisonous pigments. The arsenic is not confined to the green parts but exists largely also in the purple, blue and drab tints. The paper contains on the average, as nearly as it can be got, 125 grains of pure arsenic, equivalent to 168 grains of arsenious acid in every square yard. When we remember that two grains of arsenic may be regarded as a fatal dose, the astounding fact comes out that every square yard of this paper contains arsenic enough to kill seventy-five men. The bright green color is Paris-green, the blue probably London-purple, and the other shades only a little less in their amount of arsenic. But is it not harmless when securely fastened to the wall? Paint does not escape when once dried to the woodwork of a room, and how can the colors from a paper? The apparent analogy is not a real one. Paint contains oil which hardens and holds firmly any color however poisonous. It would probably be perfectly safe to sleep in a room painted with an oil paint containing as much Paris-green as this paper. Wall paper contains no such protector. Its colors are loosely held as every one knows. Rub your hand over most any wall paper and behold how the colors rub off! Every disturbance or jarring of the room by walking, sweeping, or in other ways, sends into the air of it particles of these colors from the paper. From one of the rooms papered with this sample I secured a small portion of dust from under the carpet and the presence of arsenic was very manifest in it by the chemical test. It has been proved to, that arsenic escapes from a wall paper in other ways than as dust. Some one or more of its many gaseous compounds, all very poisonous, is undoubtedly formed, especially if the room be damp so that the paste tends to mold. Now it is well known that arsenic is not a poison which accumulates in the system as lead does. It is constantly being eliminated, especially through the kidneys. But yet if one be exposed to small doses of arsenic taken very frequently, the system becomes gradually undermined and death may result. It is well known, too, that a weakened body is more

liable to contract disease than a strong one. So one weakened by arsenic may contract and die of other disease, and the agency of the arsenic never be suspected.

There is an impression among dealers and paperers that an arsenical paper can be told at a glance. While getting samples of paper for analysis, dealers informed me that they now sold no arsenical green papers, and seemed to think it strange that I should think of finding arsenic in those of any other color. But it is a well known fact to physicians and chemists, who have had to do with such things, that the color of a paper is no guide to its character. It happened that the papers colored by Paris-green were those which first caught the attention of physicians as sources of poisoning to their patients, and so the notion arose that such only were dangerous. But in every report upon the subject, in recent years at least, it has been made very clear that almost any colored paper may contain arsenic in dangerous amount. Dr. E. S. Wood in his elaborate report on the subject contained in the Report of the State Board of Health of Massachusetts for 1883, says: "There is absolutely nothing in the appearance of a paper by which we can form any opinion as to its arsenical or non-arsenical nature." Again, in the more recent report of D. H. Galloway to the American Pharmaceutical Association in 1889, after having examined more than 100 samples, we find the statement. "I am now convinced that it is impossible to say before examination whether a given sample contains arsenic or not." My own experience would confirm these statements in general, and yet I think I observe that the darker colored papers are the greatest sinners in this respect. It may have been simply accidental, but I found no arsenic in any of the light colored papers yet examined. One cannot help noticing, too, that the samples of arsenical paper pasted into the report of Dr. Wood, referred to above, are all dark with perhaps two exceptions. For many years past dark papers were "all the fashion" as we know, but now the light colors prevail, at least the large majority of the samples I got were light. I at first thought that my results indicated that the agitation of the matter by physicians and health boards had at last exerted that wholesome restraining action upon the manufacturers and dealers which is so desirable. I am more inclined now to think that such is not the case; and to believe, that, unless there be more positive restraint, when fashion next calls for the darker

colored papers we shall see a return to the arsenical colors of preceding years.

Of course this is not the proper place to speak minutely of the symptoms of poisoning by arsenic. Physicians will turn to their medical books and journals for detailed accounts of such. But it seems to me desirable that a few words should be said here upon the subject for the benefit of the non-professional reader especially. In the first place it should be said that poisoning by inhaling arsenic from wall paper is rarely like, in its symptoms, that from a fatal dose taken at a given time. In this respect arsenic is like other powerful drugs; repeated small doses of any of them differ in their effect from single large doses. We think of arsenic poisoning as accompanied by great pain and suffering; the stomach seems burning up and nature tends to relieve herself of the destructive principle by violent vomiting and purging. Not only the physician, but every one else knows, that something out of the ordinary course is the matter with the patient, and antidotes and the stomach-pump are at once called into service. But let the same amount of arsenic be gradually given and no such marked and extraordinary symptoms appear. Indeed, it seems to depend upon the age and general constitution of the person as to what the symptoms will be. The difficulty in formulating any typical set of symptoms for such slow poisoning has, in the past, undoubtedly prevented its recognition even by physicians, and even to-day there seems to be no general agreement in the matter. The cases cited in Vol. 120, No's 10 and 11 of the *Boston Medical and Surgical Journal* show how varied may be the symptoms in undoubted cases of slow arsenical poisoning. Some points, however, seem to be very clearly established by those and other cases, and these may well be borne in mind even by those not physicians, and the appearance of such symptoms without other apparent cause lead to a careful inspection of the wall paper in rooms inhabited by those exhibiting them. Nervous depression with irritability and sleeplessness, derangement of the stomach, soreness of the muscles, are some of the more general symptoms observed. In addition, examination invariably shows that the kidneys are affected, albumen and even casts and blood being voided in the urine, not infrequently. In such cases, too, arsenic is always found in the urine, it being the channel by which it is most rapidly eliminated from the system.

In the case under my immediate knowledge where the two children were affected by the landscape paper, they seemed to lose flesh, grew very pale and had occasional attacks of what seemed to be bilious sick-headache. They were also troubled with what they called "bad dreams" and one of them not infrequently would come into his parents room in the middle of the night and say that he couldn't sleep. Their urine unfortunately, was not examined. The children were seven and five years old. A younger child who occasionally slept in the room and frequently played there, grew very pale and had a kind of "cold sore," as it was called, on his upper lip which refused to heal for a long time, but which grew better rapidly as soon as the room was re-papered. The mother of these children who used the room as a sewing-room, at times, complained of unaccountable feeling of depression and was troubled considerably by sleeplessness. There is no reasonable doubt in my mind but what one or both of these children would have been fatally poisoned if they had not been removed from that room and its objectionable paper taken off. One of the most surprising results too of the more recent investigations of this subject is the small amount of arsenic which seems to act deleteriously when contained in a paper. In the samples given by Dr. Wood in 1883, all but three contained more than one grain per square yard, and those three very nearly a grain. He intimates too in the description of his manner of testing, that amounts much smaller than that would be too small to be considered as dangerous, but in the articles referred to in the *Boston Medical and Surgical Journal*, we find a case of poisoning referred to papers containing in round numbers one-thirtieth, one-third and one-half grains per square yard respectively. And in the report of the American Pharmaceutical Society an amount equivalent to about one-seventy-fifth of a grain per square yard is thought worthy of publication as more than a trace. I must confess, too, that some of the results of such paper seem to me most surprising.

Patients exposed to it seem to be passing enough arsenic in their urine to indicate that all the arsenic contained in the paper of a whole room would be eliminated by a single person in not an excessively long time. But however apparently anomalous these results may seem, I am inclined to regard them as anomalies of analysis or figuring rather than anything else, and to believe that even small fractions of a grain of arsenic per square yard may exert a

bad influence upon the health of occupants of a room, and I am perfectly convinced that the only safe way is to demand that no arsenic beyond a mere trace be allowed in the papers which are to cover our walls. Many foreign countries have laws to this effect and it is time that the States of our Union took action in the same direction. There was no difficulty in passing a law in Maine to prevent the use of comparatively harmless glucose in our molasses, or of oleo in our butter, but the danger to our health in the use of arsenical wall paper is far greater than from either of these.

As I said at the beginning of this paper, I regard this report as only preliminary. I intend to make many more examinations in the year to come, and hope to include not only wall papers but other colored papers and articles of clothing as well, and hope for the co-operation of all interested in sending me facts and samples.

It may be of interest to state briefly my method of analysis, for although not new in principle it is somewhat different in construction from that commonly used, and with it I am able to make more tests in a given time than in the common way, and I think with increased accuracy. I use the Marsh test, but instead of using zinc and acid, use a current of electricity from the electric light station in the town. The poles are platinum plates inserted is a U tube containing pure dilute sulphuric acid. The hydrogen is conducted through proper drying tubes and the arsenic deposited as usual. I insert the paper directly into the acid. All impurities in the zinc are thus avoided; antimony if present is kept back, and the gas stream is perfectly constant. The acid soon gets hot and the temperature can be kept at any desired point by surrounding the tube with water. By allowing it to be quite hot, the solution of the coloring matters is much facilitated. Of course if the electricity had to be generated by a battery it would be far more expensive and troublesome.

THE METRIC SYSTEM.

LENGTH.

1 Myriameter	Mm	(10.000 m.)	=6.2137 miles.
1 Kilometer	Km	(1.000 m.)	=0.62137 miles.
1 Hectometer	Hm	(100 m.)	=328 0833 feet.
1 Decameter	Dm	(10 m.)	=393.7 inches.
1 Meter	M	(1 m.)	=39.37 inches.
1 Decimeter	dm	(0.1 m.)	=3.937 inches.
1 Centimeter	cm	(0.01 m.)	=0.3937 inch.
1 Millimeter	mm	(0.001 m.)	=0.03937 inch.

SURFACE.

1 Hectare	Ha	(10,000 sq.m)	=2.471 acres.
1 Are	a	(100 sq. m.),	=119.6 square yards.
1 Centare	ca	(1 sq. m.)	=1550 square inches.

CAPACITY.

1 Kiloliter or Stère	Kl. or st.	(1,000 l.)	=61027 0515 Cu. inches,	=264.17 gallons.
1 Hectoliter	Hl	(100 l)	=6102.7052 Cu. inches	=26.417 gallons.
1 Decaliter	Dl	(10 l.)	=610.2705 Cu. inches	=2.6417 gallons.
1 Liter	l	(1 l.)	=61.0271 Cu. inches	=1.0567 quarts.
1 Deciliter	dl	(0.1 l.)	=6.1027 Cu. inches	=0.845 gill.
1 Centiliter	cl	(0.01 l.)	=0.6103 Cu. inch	=0.338 fluid ounce.
1 Millileter	ml	(0.001 l.)	=0.0610 Cu. inch	=0.27 fluid drachm.

WEIGHT.

1 Millier or Tonneau	M or T	(1,000 Kg.)	=1 Kl. or 1 Cu. m.	=2204.6 lbs. (avoird)
1 Quintal	Q	(100 Kg.)	=1 Hl. or 0.1 Cu. m.	=220.46 pounds.
1 Myriagram	Mg	(10 Kg.)	=1 Dl. or 10 Cu. dm	=22.046 pounds.
1 Kilogram	Kg	(1,000 g.)	=1 l. or 1 Cu. dm	=2.2046 pounds.
1 Hectogram	Hg	(100 g.)	=1 dl. or 0.1 Cu. dm	=3.5274 ounces.
1 Decagram	Dg	(10 g.)	=1 cl. or 10 Cu. cm	=0.3527 ounce.
1 Gram	g	(1 g.)	=1 ml. or 1 Cu. cm	=15.432 grains.
1 Decigram	dg	(0.1 g.)	=0.1 ml. or 0.1 Cu. cm.,	=1.5432 grains.
1 Centigram	cg	(0.01 g.)	=0.01 ml. or 10 Cu. mm.,	=0.1543 grain.
1 Milligram	mg	(0.001 g.)	=0.001 ml. or 1 Cu. mm.,	=0.0154 grain.

One kilogram is equal to a weight represented by one liter of distilled water at 4 degrees C.

One inch = 2.5 centimeters nearly; one quart (wine measure) = 0.946 liter; one pound Troy =0.373 kilogram; one acre =0.4046 hectare.

To reduce (approximately) grains to grams, divide by 10 and from the quotient subtract one-third of itself; to reduce drachms to grams, multiply by 4; to reduce ounces to grams, multiply by 32.

To convert degrees of one thermometer scale into those of another. Fahr. into Cent.—Divide by 9, multiply by 5 and deduct 32; Cent. into Fahr.—Multiply by 9, divide by 5 and add 32.

GLOSSARY.

This Report has been prepared for the benefit of all classes of persons in the State, and as far as possible it has been the wish to make its language as clear and intelligible as possible. A few technical terms, however, are so inseparably interwoven into the consideration of the subject of public hygiene that the avoidance of their use is impossible, and as it is desirable that the general public should become acquainted with their meaning, and especially to know in what sense they are used in the present work, this Glossary is introduced.

Aerobic. Applied to bacteria that can flourish only in the presence of air.

Ætiology. [See Etiology.]

Anaerobic. Applied to bacteria that can grow in the absence of air.

Anorexia. Want of appetite.

Anthrax. A specific disease caused by the *bacillus anthracis.*

Antiseptics. Agents which prevent or retard putrefaction; or as now understood, those which prevent the development of pathogenic or fermentative organisms. Some of these which, in weaker solutions, act as antiseptics, in stronger solutions, being destructive of the life of the organisms, are also disinfectants.

Auto-Infection. Infection of self, or from sources within the body of the person infected.

Autopsy. Ocular inspection; post-mortem examination.

Bacilli. The plural of bacillus.

Bacillus. One genus of bacteria in which the length of the cells distinctly exceeds their thickness. They are sometimes arranged in threads.

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Bacterium. The singular of bacteria.

Caecum. The uppermost part of the large intestine, next to the ileum, and separated from it by the ileo-caecal valve.

Cannula. A small tube.

Caseation. A degenerative change into a substance resembling cheese.

THE METRIC SYSTEM.

Length.

1 Myriameter	Mm	(10.000 m.)	=6.2137 miles.
1 Kilometer	Km	(1.000 m.)	=0.62137 miles.
1 Hectometer	Hm	(100 m.)	=328 0833 feet.
1 Decameter	Dm	(10 m.)	=393.7 inches.
1 Meter	M	(1 m.)	=39.37 inches.
1 Decimeter	dm	(0.1 m.)	=3.937 inches.
1 Centimeter	cm	(0.01 m.)	=0.3937 inch.
1 Millimeter	mm	(0.001 m.)	=0.03937 inch.

Surface.

1 Hectare	Ha	(10,000 sq.m)	=2.471 acres.
1 Are	a	(100 sq. m.),	=119.6 square yards.
1 Centare	ca	(1 sq. m.)	=1550 square inches.

Capacity.

1 Kiloliter or Stère	Kl. or st.	(1,000 l.)	=61027.0515 Cu. inches,	=264.17 gallons.
1 Hectoliter	Hl	(100 l.)	=6102.7052 Cu. inches	=26.417 gallons.
1 Decaliter	Dl	(10 l.)	=610.2705 Cu. inches	=2.6417 gallons.
1 Liter	l	(1 l.)	=61.0271 Cu. inches	=1.0567 quarts.
1 Deciliter	dl	(0.1 l.)	=6.1027 Cu. inches	=0.845 gill.
1 Centiliter	cl	(0.01 l.)	=0.6103 Cu. inch	=0.338 fluid ounce.
1 Millileter	ml	(0.001 l.)	=0.0610 Cu. inch	=0.27 fluid drachm.

Weight.

1 Millier or Tonneau	M or T	(1,000 Kg.)	=1 Kl. or 1 Cu. m.	=2204.6 lbs. (avoird)
1 Quintal	Q	(100 Kg.)	=1 Hl. or 0.1 Cu. m.	=220.46 pounds.
1 Myriagram	Mg	(10 Kg.)	=1 Dl. or 10 Cu. dm	=22.046 pounds.
1 Kilogram	Kg	(1,000 g.)	=1 l. or 1 Cu. dm	=2.2046 pounds.
1 Hectogram	Hg	(100 g.)	=1 dl. or 0.1 Cu. dm	=3.5274 ounces.
1 Decagram	Dg	(10 g.)	=1 cl. or 10 Cu. cm	=0.3527 ounce.
1 Gram	g	(1 g.)	=1 ml. or 1 Cu. cm	=15.432 grains.
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Cannula. A small tube.

Caseation. A degenerative change into a substance resembling cheese.

Clinical. Pertaining to a bed. Clinical observations are observations which are made at the bedside of the patient.

Contagion. The specific cause of certain diseases by means of which they may be transmitted. Also applied to the act of transmission of communicable diseases.

Contagious. Capable of being transmitted by contagion; communicable; infectious. But little effort has been made in this Report to discriminate between the meaning of Contagious and Infectious; although their derivation and original application were different, most of the later medical writers of Europe and America use the two words interchangeably. This, at least in works for popular use, is the less confusing way.

Coryza. Cold in the head.

Cyanosis. A bluish color of the skin due to lack of oxygen in the blood.

De novo. Anew. As applied to the origin of infectious diseases, their appearance independent of the contagion of preceding cases.

Deodorants. Substances which destroy offensive smells. Some, but not all deodorants, are also disinfectants. (See Disinfectants.)

Desquamation. The shedding of the outer skin, usually in scales, after scarlatina and some other diseases.

Diagnosis. The determination of the character of a disease.

Diagnosticate. To determine the character of a disease.

Diastase. A nitrogenous principle developed in grain during fermentation, and having the property of converting starch into that form of sugar which is called glucose.

Diplococcus. Double bacteria, or those which are constricted in the centre in the process of division.

Disease germs. Disease-producing bacteria. Micro-organisms whose reception into the system, and multiplication in it, produce the contagious diseases.

Disinfectants. Agents or substances by means of which the contagion of diseases may be destroyed. Often improperly applied to substances which, though useful as deodorants or antiseptics, are nearly or quite valueless as germicides.

Duodenum. The first and upper portion of the small intestine.

Dyspnoea. Difficult or labored breathing.

Endemic. Applied to diseases which prevail in particular localities or districts, and which are due to local conditions or causes.

Enteric fever. Typhoid fever.

Enzyme. A chemical ferment.

Epidemic. Common to, or affecting many people at the same time; generally prevailing; the causes of epidemics were formerly very generally regarded as depending upon an "epidemic constitution of the atmosphere," but of this there has never been collected any satisfactory proof. The more we study epidemiology the more we are led to look to contagion and the laws which govern its diffusion for an explanation of the occurrence of epidemics.

Epithelium. The outer layer of the skin and mucous membranes.

Epizootic. Applied to the diseases of animals in the same sense as epidemic is used with reference to human diseases; affecting many animals at the same time.

Etiology. The causation of diseases.

Fission. Division; the common method of multiplication with many of the lowest organisms.

Fomities. Substances or articles which are liable to carry the contagion of diseases.

Germicides. Destroyers of germs; disinfectants.

Glandular. Relating to glands.

Haemoptysis. Bleeding from the lungs or air passages.

Haemorrhage. Loss of blood.

Hectic. Pertaining to consumption or to a wasting.

Hepatization. A change through which the structure of the lungs or other organs comes to resemble liver.

House-drain. That part of the house-drainage system which carries the wastes from the soil-pipe and waste-pipe to the sewer.

Hygiene. The science and art relating to the preservation of health.

Hyperplasia. Exagerated increase in the elements of a part.

Ileum. The third or lower portion of the small intestine.

Infection. Contagion; the specific cause of communicable diseases, now known in many diseases, and supposed in others, to be a microscopic organism.

Infectious. Communicable, as a disease; contagious. (See Contagious.)

Immunity. Freedom from liability to disease.

Inoculation. Insertion of a known or suspected virus into the tissues of an animal or into a test-culture.

Laryngitis. Inflammation of the larynx.

Lesion. A wound, injury, or morbid change of a part.

Meningeal. Pertaining to the meninges.

Meninges. The membranes that envelop the brain and spinal cord.

Meningitis. Inflammation of the meninges.

Mesenteric. Pertaining to the mesentery.

Mesentery. The double fold of peritoneum connecting the small intestines with the posterior wall of the abdominal cavity.

Meteorological. Pertaining to meteorology, or that science which treats of the air and its phenomena.

Miasm. A term vaguely applied to noxious exhalations.

Miasma. The same as miasm.

Microbe. Bacterium; micro-organism.

Micrococcus. A genus of the bacteria, consisting of very small, globular or oval organisms.

Micro-organism. A minute organism.

Non-pyrexial. Without fever.

Nosology. Classification of diseases.

Œdema. A swelling from effusion of serous fluid into the cellular tissues.

Pathogenic. Generative or productive of disease.

Pathological. Pertaining to pathology; diseased.

Pathology. The knowledge of diseases.

Peritoneum. A serous membrane investing the abdominal walls and viscera.

Phthisis. Consumption; pulmonary tuberculosis.

Physiology. The science which treats of the functions of living animals or plants.

Pleura. The serous membrane lining the cavity of the chest.

Pleurisy. Inflammation of the pleura.

Prognosis. The prediction, from the present symptoms of a disease, of its future course or termination.

Pseudo-membrane. False membrane.

Ptomaines. Basic compounds resulting from putrefactive changes in animal tissues. Many are highly poisonous.

Sanitaria. Plural of sanitarium.

Sanitarium. An establishment for the cure of diseases.

Scarlatina. Another name for scarlet fever.

Schizomycetes. A class of unicellular organisms multiplying by fission and also in some cases by the formation of spores. Bacteria.

Septic. Pertaining, or due to putrefaction.

Serous. Relating to serum, or to the membranes which secrete it.

Serum. Watery, clear or yellowish, animal fluids, exhaled by serous membranes, or separated from the coagulable parts of other fluids, like blood or milk.

Sewage. The liquid or other filth conveyed in sewers.

Sewer. A drain for conveying dirty water and filth.

Sewerage. A system of sewers.

Soil-pipe. The pipe which conveys excreta from water-closets and urinals. (See House-drain.)

Sporadic. Applied to diseases, it means occurring in single or scattered cases, as opposed to epidemic or endemic, in which numbers, or many are affected.

Spores. Minute particles or bodies which are formed within many of the lower flowerless plants, and which perform the functions of seeds. The microscopic one-celled plants called bacteria, multiply by fission, and in addition to this, some of them multiply by means of spores.

Sporification. The formation of spores.

Staphylococcus. A genus of round bacteria, or cocci, arranged in groups like clusters of grapes.

Stenosis. A narrowing.

Sterilize. As used in bacteriology, the freeing of culture fluids or other substances, of bacteria which are capable of development.

Streptococcus. Cocci or round bacteria, arranged in rows or chains.

Therapeutical. Pertaining to the art of healing.

Tonsilitis. Inflammation of the tonsils.

Trap. An arrangement on some part of the sewerage system, usually a bend in the pipe in which water stands, by means of which we seek to prevent the return of gases and disease germs into the building.

Tubercular. Pertaining to, or affected with, tubercle.

Tubercle. Nodules of greatly varying size constituting the disease tuberculosis.

Tuberculosis. A specific disease usually characterized by the formation of tubercles. Pulmonary consumption is a tuberculosis of the lungs.

Typhoid fever. Meaning literally a fever resembling typhus. The common fever of this country. Formerly typhus and typhoid were not distinguished, the one from the other. Typhoid fever is communicable only in a slight degree, if at all, by direct contagion; but there is great danger of its spread from the sick to the well from defective sanitary arrangements and regulations.

Typhus fever. A dangerously contagious disease rarely found in this country, and when appearing in our State, probably always by importation. (See Typhoid fever.)

Varioloid. Small-pox modified by vaccination. It is contagious, and cases of small-pox as severe may arise from exposure to its infection as from unmodified small-pox.

Virus. An infective agent.

Waste-pipe. That part of the house-drainage system which conveys the waste-water from sinks, baths, etc.

Zymotic. Characterized by fermentation. Applied to epidemic, endemic and contagious diseases, on account of the similarity between the process of fermentation and that which is started in the organism after its infection with the cause of any of these diseases.

INDEX.

SIXTH ANNUAL REPORT

OF THE

[ATE BOARD OF HEALTH

OF THE

STATE OF MAINE.

For the Year Ending December 31, 1890.

AUGUSTA:
BURLEIGH & FLYNT, PRINTERS TO THE STATE.
1891.

MAINE STATE BOARD OF HEALTH.

OFFICE OF THE SECRETARY,
Augusta, Maine, 1891.

To His Excellency, Edwin C. Burleigh, Governor, and the Honorable Executive Council:

GENTLEMEN:—I have the honor of submitting to you the Sixth Annual Report of the State Board of Health of Maine.

Very respectfully,

A. G. YOUNG, M. D.,

Secretary.

MEMBERS OF THE BOARD.

E. C. JORDAN, C. E., *President*,	Portland.
O. A. HORR, M. D.,	Lewiston.
J. O. WEBSTER, M. D.,	Augusta.
CHARLES D. SMITH, M. D.,	Portland.
PROF. F. C. ROBINSON,	Brunswick.
HUGH R. CHAPLIN, ESQ.,	Bangor.
A. G. YOUNG, M. D., *Secretary*,	Augusta.

CONTENTS.

Special Papers—*Continued.*

INTRODUCTORY.

Early in its existence, the State Board of Health, recognizing both its opportunities for usefulness and the limitations in that direction imposed by a moderate yearly appropriation, as compared with the amounts at the disposal of some other state public health departments, devoted itself to those fields of practical work, in which there appeared to be the most urgent need, and contented itself with doing what was possible to do in the direction of original scientific work. Our principal calling, therefore, has been the protection of the public from those causes of disease and death which can be guarded against, the awakening of the people from their spirit of resignation to the inevitableness of pestilential and epidemic prevalences, a belief worthy only of an age of less general enlightenment than our own, and to making suggestions for the improvement of our public health laws. To do creditable work in these directions, it is above all things, necessary to furnish a free and self-govering people trustworthy knowledge about public and private hygiene. They must know the need of doing certain things and of not doing certain other things, and they must know somewhat of the reasons for doing or for abstaining from doing them.

To make knowledge of this kind accessible and to popularize it, —to act as an intermediary between scientific workers and the public,—has been a large and important part of the duty of the State Board of Health. This educational work has been carried on in three ways:

1st. Through the annual report. The aim has been to make this yearly volume the store house of that part of our current sanitary history worthy of permanent preservation and of papers of interest and of value to private citizens, local boards of health and physicians.

2d. Through circulars and health tracts, giving plain and concise information about health matters which everybody ought to know To render some of the most important elements of sanitary knowledge as far as possible a common possession of the people, the circulars are kept permanently in type and are supplied to members of local boards of health, physicians, clergymen, or to anybody else who will judiciously distribute them, or who wish them for their own use. Exclusive of blanks supplied to local boards of health only, the following circulars have been prepared:

Form 21. Practical Facts about Cholera.
" 23. Earth Closets.
" 26. Small-pox, its Prevention and Restriction.
" 27. Does Vaccination Protect?
" 29 Treatment of the Drowned.
" 30. Contagious and Parasitic Diseases of Animals.
" 38. Disinfectants and their Uses.
" 40. Rules for House Drainage.
" 44. Diphtheria, Its Prevention and Restriction.
" 45. Scarlet Fever, Its Prevention and Restriction.
" 46. Typhoid Fever, Its Prevention and Restriction.
" 47. Is Diphtheria Contagious?
" 48. Isolation of the Infectious Sick.
" 49. Motives and Methods for Sewering, Cities, Villages, and Summer Resorts, etc.
" 50. Contagious Diseases and Contagion.
" 51. To Teachers.
" 53. Characteristics of the Infectious Diseases.
" 54. Prevention of Consumption.
" 60. La Scarlatine.
" 61. La Diphtherie.
" 62. La Diphtherie, est elle Contagieuse?
" 63. La Fievre Typhoide.
" 64. La Prevention de la Consomption.

3d. *The Sanitary Inspector*, published monthly by the Board. It serves as a medium of communication between the State Board on the one hand and the local boards and the public on the other. It summarizes much of the most important current sanitary news within and outside the State, and gives information which should go into every household Circumstances render it impossible to send this to the public as an entirely free gift, but its subscription price is made as nearly merely nominal as possible.

Thanks to the universal brotherhood of the workers in the cause of public health, the investigations in the well endowed laboratories of Europe and of this country, and the results of the original work of those public health departments that have ample funds, are free and available to all who can obtain and read their works.

A survey of the part of this work which the local boards of health are doing, whether in the role of instructors, or as the agents for the execution of our public health laws, gives reason for a good degree of satisfaction. The efficiency of the local boards generally we believe has steadily increased, and a candid examination of the extracts from their annual reports, we think, will substantiate what we say. In the first place, the number of boards reporting to this Board in 1890 is 400 out of a total of 430 towns, against 378 in 1889, and 338 in 1888. Again, it may be observed that outbreaks of diphtheria, scarlet fever and typhoid fever have in almost all instances been confined to the primary cases or the first family.

In meeting and talking with members of the local boards, even when from the farms or shops of our smaller and more remote towns, we have often found a remarkably clear understanding of the duties of a local board of health and of the practical application of remedial measures to the prevention or mitigation of threatening conditions. Many of these duties require some degree of technical knowledge and skill of a kind which any intelligent person may master with a little careful attention, but the better with some practical experience in actual work. There is, therefore, a great advantage in the Maine law, which, in the normal course of events, provides that each member shall be appointed for three years, and that only one new hand shall come on the board at a time. With this optimistic view it must be admitted that there are chances enough for improvements in public health work.

Infectious Diseases. Of the three most serious infectious diseases, diphtheria, scarlet fever and typhoid fever, it appears from the reports of the local boards of health, that there was only a moderate prevalence in the State generally. There were, however, a few notable local exceptions. Of 400 local boards of health, 120 expressly state that no cases of diphtheria, scarlet fever, or typhoid fever occurred during the year, and 40 other boards do not report cases of these diseases; or a total of 160 towns in which these dis-

eases are not reported as having occurred. Last year of 378 boards reporting, 159 contained no reports of these infectious diseases.

Diphtheria. The reports show that during the year 1890, cases of diphtheria occurred in only 96 towns, as against 138 in 1889. The most serious and prolonged outbreak of this disease occurred in Eastport, apparently due to the causes set forth on pages 11–16. That any intelligent person acquainted with the studies which have been made into the nature of diphtheria in the last few years. should doubt its contagious and infectious qualities, is surprising; and that he, furthermore, should wish to influence his fellow towns-people to take risks with so fearful a disease, even if he entertains the doubt as to contagion, is still more surprising to say the very least. We feel strongly on this subject because we believe that every word of doubt, as to the communicability of diphtheria, every word which leads the people to act carelessly with diphtheria, is a great injustice to them, and often leads to lamentable consequences The people generally are all too ready to generalize from insufficient data. They know of cases of diphtheria from which the disease, as far as can be seen, has not spread although the circumstances seemed favorable for it to do so. Abundant evidence is at hand for just this sort of reasoning to show that neither scarlet fever nor small-pox are contagious The value of this negative kind of evidence is often unduly estimated.

As showing the present position of this question, we would say that the leading medical teachers and sanitarians of the present day who do not believe in the contagiousness of diphtheria are very few indeed We do not know of one of eminence at home or abroad.

Diphtheria is to be steadily fought as one of the greatest enemies of child life. Children are to be guarded from its infection as one would protect them from that of small-pox. There is the more reason for doing this, in the fact that, with increasing age, the child outgrows, in a large measure, the susceptibility to the infection. This is well shown in the report made last year to the American Public Health Association, by the Committee on the Cause and Prevention of Diphtheria. Of 19,824 cases collected there were:

"Seven per cent. under one year of age; fifty-seven per cent between one and five years; twenty-eight per cent. between five and ten years; five per cent. between ten and twenty years; two p

cent. between twenty and forty years; six-tenths per cent. between forty and sixty years; four-tenths per cent. over sixty years."

Thus ninety-two per cent. of the cases occurred in children who had not passed the tenth year.

Scarlet Fever. Scarlet fever was reported in 86 towns in 1890 as compared with 82 towns in 1889. In the great majority of outbreaks the disease appears to have been of rather a mild type, as it was in the preceding year. In the latter part of the year, our eastern border was threatened by the prevalence of scarlet fever in a serious form at some points just across the line in New Brunswick. The local board of Forest City, separated from the infection by only a narrow stream and a bridge, acted promptly, and did what it could to prevent the importation of the disease, but it was introduced in spite of its work. From the same source the infection was introduced into Brookton where a newly formed board of health did good work in stamping out the infection. The health officer of Vanceboro gives an instance in his report of criminal carelessness which resulted in an outbreak. In one town the physician attending a case of scarlet fever failed to notify the local board of health as the law plainly provides. The house, therefore, was not placarded; the child was not kept in the sick-room as long as she ought to have been, but was allowed to run out and play with other children while in an infectious condition. One of the playmates, a healthy little boy, had lately come on a visit with his mother, all unconscious of the danger so near. The boy took the disease and died. No wonder the feeling of the parents was one of bitterness for the great wrong which they felt had been done them.

Small-Pox. There was but one outbreak of this disease during the year. As is known to the residents of this State, it was imported by a sailor who it is believed contracted the disease in Porto Rico. The history of this little outbreak emphasizes anew the unreasonableness and the peril of neglecting vaccination, especially by persons who run as many chances of infection as the seafaring class. The master and owners of every ship ought to insist, as far as it is practicable, upon vaccination for their crews. One other piece of advice we think captains of vessels would do well to take willingly from motives of self interest; that is, to report to the quarantine officials at once, if, upon entering port, there is a suspicion of having on board a dangerously contagious disease. The quarantine of the present day is very different from

the old time quarantine. Instead of being held for many days for the infection to die out, at the larger ports, like New York and Boston, where facilities for rapid and efficient disinfection exist, the vessel is now retained for only a few hours, or a very few days. The vessel is then given a clean bill of her health and the trouble and suspense is done with.

Measles and Whooping Cough. Whooping cough appears to have been unusually prevalent in the State, it having been reported by sixty-six local boards. Measles was reported by only seventeen boards. As the law does not make the reporting of these diseases compulsory, it is likely that they were present in a considerably larger number of towns than the reports make it appear. These two diseases, though not among those specified in the law, nevertheless are often the cause of much trouble, and sometimes of a pretty high rate of mortality. They should not be ignored by the public and by local boards of health. When prevalent, the law for the protection of the schools should be put into operation, and, to keep the school-rooms from being the point for the diffusion of the infection the teachers should be instructed to coöperate with the board as the law provides.

Rabies and Hydrophobia. Quite a senation was produced in the State in the spring by outbreaks of rabies among dogs in Brunswick and Lisbon, and the death of a respected citizen from hydrophobia in each of these towns was a lamented result. Each of these towns took measures to check the spread of the infection by the destruction of all rabid animals and those supposed to have been bitten by animals affected with rabies, and the muzzling and restriction of the liberty of all dogs. At the meeting of the State Board in June, the following instructions were prepared for the use of local boards of health in case of future outbreaks of rabies: "To destroy all rabid animals and to confine under competent observation all bitten animals and all under suspicion of having been bitten, or having come in contact with rabid animals until the question of their being affected with the disease can be positively determined, and to require all dogs, without exception to be securely muzzled and not permitted to run at large."

Cerebro-Spinal Meningitis. This disease is interesting to the public health officer for the reason that the question as to its contagious or infectious nature is not satisfactorily determined, and for the additional reason that it is sometimes characterized by

terrible rapidity of its onset, a high rate of mortality, and by certain serious lesions of the nervous system often left as sequels in the survivors. The doubt as to its contagiousness would justify reasonable precautions against its spread in this way. A few cases of this disease were reported in Houlton, Sanford, St. Albans and Veazie.

Drowning Accidents. Reports from seventeen local boards of health state that drowning accidents occurred in their towns in which one or more persons lost their lives. We find it stated in none of these reports that intelligent. systematic efforts were made to resuscitate any of these drowned. or apparently drowned persons, after their bodies were recovered. Nevertheless, experience in this direction shows that, if recovered within a little while after the accident occurs, a pretty good proportion of the unfortunates may be brought back to life, if prompt and well directed efforts be made in this direction. This is the reason why the State Board in 1886 published "Circular No. 29, Treatment of the Drowned," and has distributed it more or less extensively since, but we feel that its teachings have not become so widely known as they should be. Its practical methods for saving the drowned should become known by every citizen of the State, and teachers should use the little tract as a lessen in practical hygiene. A few minutes only are needed to read it carefully. The aggregate of time thus spent would be amply paid for if it should result in the restoration to life of a few of the victims of accidents of this kind.

"The evidence" says the Secretary of the State Board of Health of Michigan, in his report for 1874, "which leads to the belief that many of these lives might have been saved through the vigorous use of the proper means for resuscitation, is strengthened by the fact that it not very infrequently happens that persons supposed to be dead from drowning are accidentally restored to life. The following are instances: A clergyman in this city tells me that such a case is within his knowledge, being that of a young man removed from the water apparently drowned, but who recovered after having been somewhat shaken up by being rapidly conveyed some little distance in a wheeled vehicle of some kind. An editor in this city mentions a similar instance which occurred in the western part of this State a few years since. Two boys were bathing in the edge of a lake, when through some means the oldest sank beyond the reach of the other, and was apparently drowned. The

remaining boy ran to the house, a distance of about twenty rods, secured the assistance of his sister, and returned to the lake. The body of the boy was then recovered, and being unable to carry it home, they placed it in a 'pounding-barrel' and proceeded to roll the barrel homeward. It will be seen by the above account that the body must have been in the water some little time. Before they reached home the boy that was apparently dead when they started had so far recovered as to vomit, and he was eventually completely restored to life. From a letter received from Dr. J. H. Beech, of Coldwater, I extract the details of another case, as follows: I have learned from an intelligent young man who was at the 'Silver Lake, Hillsdale county, disaster,' that a young lady who was given up by all present as past hope, was put in a lumber wagon and covered with blankets, for decency's sake only, and the smart jolting effected resuscitation in a drive of a mile or two. She still lives, and it is possible that if some of those left near the lake until the next day, or whose bodies were carried thence with all the tenderness that refinement dictates, had been subject to the energetic shaking of lumber wagons, better result might have surprised the horror-stricken friends."

Burning Accidents. Several severe or fatal burnings have been reported that were clearly the result of gross carelessness. One of this kind, in which a man, his wife, and three children were all severely burned by trying to clean a tin dish by boiling kerosene oil in it. We have every year made inquiry as to kerosene accidents and should feel grateful for information from any source about accidents of this kind.

Domestic Economy. The growing interest in this subject evidenced in the establishment of special schools of cookery in various places, the founding of a department of household economy in one of our leading colleges for women, and the movement to provide instruction in cooking and sewing in connection with the common schools in a few places. The importance of all this, having so intimate a connection, as it does, with healthful and happy living, can hardly be over estimated. As an unusually valuable contribution on this subject, we are glad to be able to republish in this report, "Practical Sanitary and Economic Cooking."

SECRETARY'S REPORT.

It is with pleasure that we can again begin an annual report with the statement that, in the year just passed, the State Board of Health and the local boards have had but few serious epidemics of contagious diseases to contend with; nevertheless infection in some of its dangerous forms is always near, and not a week nor hardly a day has passed without the receipt of intelligence of outbreaks of infectious diseases which, if neglected, would, in some cases, have assumed the proportions of epidemics. That these outbreaks have not more frequently spread from the houses in which they have first appeared, we feel sure is due, in a large measure, to the faithful and intelligent action of the local boards of health. On the other hand we are sorry to say that the non-observance of, or tardy compliance with, the plain provisions of the law on the part of some physicians, or local boards of health, or other persons, has sometimes provided the opportunity for the spread of the infection, and necessitated a final struggle much more troublesome and costly than it need have been.

In the office of the State Board of Health the work has steadily increased, and its demands upon the Secretary are never-ceasing. The daily correspondence with local boards of health and other persons is extensive, the calls for advice on questions of public health are frequent, the reports of outbreaks of infectious diseases have to be responded to with the supplies of the necessary circulars and other printed matter furnished by this office, unless the records indicate that they are on hand in sufficient numbers or quantities. Analyses of samples of water for the purpose of determining their suitability as drinking-water supplies have been made upon request, as far as the other work of the office would permit, for local boards of health, physicians, water companies and private citizens of the State. As usual we reproduce but

little of the correspondence necessary to carry on this work, and save as large a space as possible for matter of lasting interest and value.

The names and addresses of the Board at the end of the year with the dates at which their terms of office expire are as follows:

CHAS. D. SMITH, M. D., Portland, term expires January 31, 1891.

J. O. WEBSTER, M. D., Augusta, term expires January 31, 1892.

E. C. JORDAN, C. E., Portland, term expires January 31, 1893.

O. A. HORR, M. D., Lewiston, term expires January 31, 1894.

PROF. F. C. ROBINSON, Brunswick, term expires January 31, 1895.

HUGH R. CHAPLIN, Bangor, term expires January 31, 1896.

The sad death of the Hon. Lewis Barker of Bangor, who had been a member of the Board since its establishment, necessitated the filling of the vacancy thus caused, and Hugh R. Chaplin, Esq., of the same city was appointed by the Governor as a member of the Board to fill the unexpired term.

At the annual meeting March 31, 1890, E. C. Jordan, C. E., was unanimously elected President for the ensuing year.

The following standing committees were appointed or re-appointed for the year:

On Finance—Hon. Lewis Barker, J. O. Webster, M. D., and the Secretary.

On Publications—C. D. Smith, M. D., J. O. Webster, M. D., and the Secretary.

On Disposal of Excreta—C. D. Smith, M. D.

On Ventilation—O. A. Horr, M. D., E. C. Jordan, C. E., and the Secretary.

On Summer Resorts—E. C. Jordan, C. E., and the Secretary.

On Sewerage and Drainage—E. C. Jordan, C. E., and Prof. F. C. Robinson.

On Water and Water Supplies—Prof. F. C. Robinson, and the Secretary.

On School-Houses and School Hygiene—J. O. Webster, M. D., and the Secretary.

On Sources of Animal Vaccine—C. D. Smith, M. D.

At the quarterly meeting of the Board in December, the following resolutions were passed:

Resolved, That in the death of the Hon. Lewis Barker, the State Board of Health loses a fellow-worker who has endeared himself to every member of the Board by his genial ways, by his sympathy with the objects of the Board, and by his ready willingness to help, from his varied experience, in the solution of the many questions, legal and otherwise, that have arisen.

Resolved, That we can poorly express in words our sorrow for this loss—a loss deeply felt by the State at large.

At the annual meeting in March, Dr. Smith reported verbally to the Board the results of his examination of the animal vaccine establishments near Boston in accordance with the authorization to do so given at the last meeting of the Board. At this meeting he was instructed to make such futher examinations of these establishments and of any others as he deems necessary, and to make a full report of the results to the Board.

The Secretary was instructed to request Dr. J. B. Hamilton, Supervising Surgeon-General, Marine Hospital Service, Washington, D. C., to appoint Dr. C. D. Smith of Portland and Dr M. L. Young of Vanceboro as special inspectors in accordance with the suggestion of Dr. Hamilton in relation to the exclusion of leprosy from this country.

The Secretary was further instructed to correspond with the Chief of the Signal Service to see what arrangements could be made with that office for the establishment of a larger number of local meteorological stations in the State.

At the quarterly meeting in June it was voted to authorize the Secretary to act for the Board in making appointments for local boards of health in those towns in which the municipal officers have been requested, in accordance with chapter 227, section 1, laws of 1889, to act, and have failed to do so; this power to be exercised only in an emergency.

At this meeting it was *Resolved*, That this State Board of Health learns with great satisfaction of the work of house to house sanitary inspection prosecuted by the local boards of health of Augusta and Portland, and that this board urges upon the local health boards of other cities and towns the necessity of carrying out such inspections so far as they may be able to do so, as adding in no small degree to the efficiency of their sanitary work and contributing directly to the public welfare.

Prof. Robinson gave a verbal report of the outbreak of rabies in Brunswick and of the measures that had been taken to prevent further spread of the infection. The Secretary was advised to instruct other towns, if need be, to take the following precautionary measures for the prevention of the spread of rabies, viz: To destroy all rabid animals, and to confine under competent observation all bitten animals and all under suspicion of having been bitten, or having come in contact with rabid animals, until the question of their being affected with the disease can be positively determined, and to require all dogs, without exception, to be securely muzzled and not permitted to run at large.

It was voted that the Secretary be authorized to act for the Board at his own discretion in giving permits for the disinterment and removal of dead bodies in accordance with the provisions of Rule 8 of the "Rules and Regulations of the Association of General Baggage Agents," relating to such matters. These rules have been adopted by most of the railway companies in the country. They are as follows:

RULES FOR TRANSPORTATION OF DEAD BODIES.

ADOPTED BY THE

NATIONAL ASSOCIATION OF GENERAL BAGGAGE AGENTS, AUGUST, 1889.

Rule 1. The transportation of bodies of persons dead of small-pox, Asiatic cholera, leprosy, typhus fever or yellow fever is absolutely forbidden.

Rule 2. The bodies of those who have died of diphtheria, anthrax, scarlet fever, puerperal fever, typhoid fever, erysipelas, measles, and other contagious, infectious or communicable diseases must be wrapped in a sheet thoroughly saturated with a strong solution of bichloride of mercury, in the proportion of one ounce of bichlorid of mercury to a gallon of water; and encased in an air-tight zinc, tin, copper, or lead-lined coffin, or in an air-tight iron casket. hermetically sealed, and all enclosed in a strong, tight wooden box; or the body must be prepared for shipment by being wrapped in a sheet and disinfected by solution of bichloride of mercury as above, and placed in a strong coffin or casket, and said coffin or casket encased in a hermetically sealed (soldered) zinc,

copper or tin case, and all enclosed in a strong outside wooden box of material not less than one inch and a half thick.

Rule 3. In cases of contagious, infectious or communicable diseases, the body must not be accompanied by articles which have been exposed to the infection of the disease. And in addition to permit from Board of Health or proper health authority, agents will require an affidavit from the shipping undertaker, stating how body has been prepared and kind of coffin or casket used, which must be in conformity with Rule 2.

Rule 4. The bodies of persons dead of diseases that are not contagious, infectious or communicable, may be received for transportation to local points in same state, when encased in sound coffin or metallic case, and enclosed in a strong wooden box, securely fastened so it may be safely handled. But when it is proposed to transport them out of the State to an interstate point (unless the time required for transportation from the initial point to destination does not exceed 18 hours.) they must be encased in an air-tight zinc, tin, copper or lead-lined coffin, or an air-tight iron casket, or a strong coffin or casket encased in a hermetically-sealed (soldered) zinc, copper or tin case, and all enclosed in a strong outside wooden box of material not less than one inch thick. In all cases the outside box must be provided with four iron chest handles.

Rule 5. Every dead body must be accompanied by a person in charge, who must be provided with a ticket, and also present a full first-class ticket marked "Corpse," and a transit permit from Board of Health, or proper health authority, giving permission for the removal, and showing the name of deceased, age, place of death, cause of death, (and if of a contagious or infectious nature) the point to which it is to be shipped, medical attendant and name of undertaker.

Rule 6. The transit permit must be made with a stub, to be retained by the person issuing it; the original permit must accompany the body to destination, and two coupons, the first coupon to be detached by agent at initial point and sent to the general baggage agent, and the second coupon by the last train baggageman. The stub, permit and coupons must be numbered so the one will refer to the other, and on back of permit will be a space for undertaker's affidavit, to be used in cases of contagious and infectious diseases, as required by Rules 2 and 3.

Rule 7. The box containing corpse must be plainly marked with paster, showing name of deceased, place of death, cause of death, the point to which it is to be shipped, number of transit permit issued in connection, and name of person in charge of the remains. There must also be blank spaces at bottom of paster for station agent at initial point, to fill in the form and number of passage ticket, where from, where to, and route to destination of such ticket.

Rule 8. It is intended that no dead body shall be moved which may be the means of spreading disease, therefore all disinterred bodies, dead from any disease or cause, will be treated as infectious and dangerous to the public health, and will not be accepted for transportation unless said removal has been approved by the State Board of Health, and the consent of the health authority of the locality to which the corpse is consigned has been first obtained, and the disinterred remains enclosed in a hermetically-sealed (soldered) zinc, tin or copper-lined coffin or box incased in hermetically-sealed (soldered) zinc, tin or copper cases.

At the quarterly meeting in December a communication from John S Billings, M. D., Washington, D. C., relative to the International Hygienic Congress to be held in London next August was presented, but action in the matter was deferred to a future meeting.

The Secretary called the attention of the Board to the report that the immigration from the old country to the West has been quite largely diverted from New York to the port of Halifax and the Canadian Pacific Railroad, and that, therefore, if this is true, the country will be subjected to considerable danger from imported infection, unless the inspection and quarantine service at the port of Halifax are trustworthy. The Secretary was instructed to correspond with Dr. Montezambert of Quebec, or with Dr. John B. Hamilton, Supervising Surgeon-General, Washington, D. C, to learn the truth as regards the condition of the quarantine regulations at Halifax. The following correspondence ensued:

AUGUSTA, Maine, January 15, 1891.

Dr. J. B. Hamilton, Surgeon-General, M. H. S., Washington, D. C.

DEAR SIR:—Last year I learned from report that a considerable proportion of the foreign immigration which has hitherto landed

New York had been diverted to a line of steamers landing at Halifax, Nova Scotia, whence it journeys to the West by the way of the Canadian Pacific Railroad which now traverses this State, entering at Vanceboro on the east and leaving the State near Lake Megantic near our northwest line.

I consequently was led to consider the question of the danger of importing infection into our country through this route, and requested Dr. M. L. Young of Vanceboro, recently appointed by you as Medical Inspector under your Department, to make inquiries as regards what precautions were taken at Halifax to prevent the entrance of infectious diseases. He made some inquiries by correspondence with the Halifax officials and the railroad officials, to learn the facts in the case, but did not find the persons of whom he made enquiries very communicative and therefore did not learn much.

I would therefore, respectfully suggest the expediency of your department taking measures to learn whether the Halifax quarantine system is trustworthy or not. The great bulk of this immigration, I presume, goes to the west, and, therefore, this is a matter which concerns the western states more than it does the State of Maine

Respectfully yours.

A. G. YOUNG. *Secretary.*

TREASURY DEPARTMENT,
OFFICE OF THE SUPERVISING SURGEON-GENERAL.
U. S. MARINE HOSPITAL SERVICE,
WASHINGTON, January 20, 1891.

Dr. A. G. Young, Secretary State Board of Health, Augusta, Me.

DEAR SIR:—I am in receipt of your letter of the 15th instant, asking relative to precautions taken at Halifax to prevent the introduction of infectious disease by the emigrants arriving at that port, and in reply, beg leave to say that a request has been made for a consular report, on receipt of which the desired information will be given you.

Respectfully yours.

JOHN B. HAMILTON,

Supervising Surgeon-General, M. H. S.

SMALL-POX IN SEARSPORT.

June 4, a telegram came from Dr. E. Hopkins, Secretary of the local board of health of Searsport reading as follows: "Have case small-pox in town. Send one package vaccine points by mail." Ten points on hand were forwarded at once and a telegram was sent to Boston for additional points to be forwarded direct to the doctor. Further information came to this office in the following letter written by the local secretary on the 5th and received here on the 6th of June.

"Our small-pox case came from Boston per steamer Penobscot last Saturday, May 31. Left the vessel which arrived the Wednesday before from the island of Porto Rico, with cargo of molasses, 14 days passage, Friday afternoon, and went directly on board steamer, arriving here Saturday forenoon. A letter from the captain's wife informs me that a physician, who I suppose was a quarantine doctor, visited him on the vessel and examined him, and said he had a very bad humor, but saw no signs of small-pox. He was sick more or less the whole passage to Boston with fever, backache, etc., especially about the twelfth day from the time he left the island. He did not go ashore while in port, but mingled more or less with the natives that were loading the vessel, and they say they always have small-pox there on the island. We have isolated him in a small house just out of the village, and have a male nurse who has had the disease, to care for him, and are using disinfectants freely. About six or eight persons have been exposed to it more or less, but I think they are very well protected, and we have again thoroughly vaccinated them. I have received a good supply of vaccine points from Dr. Martin & Son, Roxbury, Mass., and am using them freely. I will communicate with you again if anything of importance occurs."

Immediately on the receipt of this letter a telegram was sent to Dr. Hopkins as follows:

"Please telegraph immediately, paid here, answers to the following: Name of patient, name of vessel from Porto Rico, date when eruption first appeared, stage of eruption when arrived in Searsport."

At the same time the Boston Board of Health received this information by telegraph:

"Case of small-pox in Searsport, this State; patient came from Boston, Friday, May 30th, on steamer Penobscot; arrived in Boston May 28th from Porto Rico; cargo molasses. Hope to telegraph further facts later to-day. Steamer leaves Boston this afternoon."

Later in the day the following came from Dr. Hopkins:

"Patient's name, Linwood A. Fowler; name vessel, schooner Lizzie Lane, Searsport; first eruption about May 28th. On arrival here out on face, upper part body, arms, and beginning to show on legs; vessel chartered to load ice at Bath, Me., and may be there now."

These facts were telegraphed to Boston and the same afternoon the following telegram was sent to the secretary of the local board of health of Bangor:

"Case of small-pox in Searsport. Arrived from Boston last Saturday on steamer Penobscot. Take precautions."

A letter of warning was also sent to the local board of each port at which the steamer Penobscot touches, requesting the board to learn whether any passengers had landed on that day when the small-pox patient was aboard, and, if so, to take precautions. Bath was also notified to be on the lookout for the Lizzie Lane.

As we had not learned from Boston whether the "Penobscot" had been disinfected, the following telegraphic message was sent to Bangor on the seventh.

"If steamer Penobscot was not disinfected in Boston, the infected stateroom or birth and bedding should be seen to before Monday. Small-pox patient's name, Linwood A. Fowler, Boston to Searsport."

On the evening of the same day information came from Boston that "the schooner Lizzie Lane has cleared from this port for Randolph, Me. We are making active search for her, and if found will be detained. She was not seen by the quarantine officer upon arrival to this port, quarantine not being on until June 1st, except with vessels having sickness aboard."

Under date of June 8th, the Secretary of the local board of health of Bangor wrote:

"As soon as the Penobscot arrived here Saturday I went down and saw the captain and the first he heard about it was that morning, he said that a man came aboard at Boston and said he did not feel well and wanted a stateroom. He got one and did not come out until he got to Searsport. The room has not been used since, and now it has been fumigated and the bedding burned and every

precaution taken that could be. I was there to day and know that this was done, and they said that they would clean the room thoroughly and would not have it used for some time "

Two days later, June 10th, Dr Durgin, Chairman of the Board of Health of Boston wrote: "The Lizzie Lane was overtaken and held in quarantine until she was thoroughly attended to."

Meanwhile the authorities at Bath and other ports had been on the watch, for various rumors from various sources had been received as to the destination or actual whereabouts of the infected schooner. These places were at once notified of the disinfection of the vessel.

Turning again to Searsport, the unwelcome news came that Mr. Fowler, the small-pox patient died June 7. On account of ill health, Dr. Hopkins resigned his position and a new Board was formed with Dr. E. W. Gould, Secretary.

Six persons were exposed to the infection before the diagnosis of the first case was made, viz:

A D. F., aged 54, mother of the deceased. She was vaccinated when a girl and not since that time until June 3d, 1890, which did not take. She was revaccinated on the 8th. She came down the 13th and was confined to her bed until the 20th, the eruption aborting. It was a well marked case of varioloid.

E F., aged 30, sister of the deceased. She was vaccinated when a young child, was again vaccinated June 3d, and again on the opposite arm June 7th Both vaccinations in June took well. She was exposed to the infection with the other five persons June 1st, developed the initiatory symptoms on the 15th, the eruption appeared on the 17th, and she was removed to the pest house. The eruption became umbilicated June 23d. This case ran a modified course.

N. S., aged 70, uncle. He was vaccinated when thirty years old, but declined vaccination in June. He complained of general malaise June 14th, took his bed two days later, with a sense of great muscular weakness A few papules appeared on his forehead and back. June 23d the temperature and pulse were normal, the tongue was clearing, and the eruption was aborting. He made a rapid recovery. The temperature did not exceed 100 and the pulse was not above 80 per minute.

J. C , aged 78, grandfather. He was vaccinated with success June 3d, but had never been before He did not take the disease.

J. P., aged 67, a neighbor. was successfully vaccinated June 3d. He also had a good scar as the result of vaccination when a boy. He escaped.

G. N., aged 48, a neighbor. He had been vaccinated when a young man; the vaccination in June did not take well. He did did not contract the disease. It will be seen, therefore, that of the six persons who were exposed to the infection of the disease before its character was recognized, three had small-pox, and three escaped it.

Mr. Fowler, the subject of the first case, had never been vaccinated. I am indebted to Dr. Gould for the following facts:

DIPHTHERIA IN EASTPORT.

By far the most serious and protracted epidemic of diphtheria of the year has held on in Eastport The history of it is instructive, and strongly emphasizes the need of constantly keeping up the organization of a local board of health ready to deal with the primary cases of infectious diseases.

About the middle of March (17th,) I received a letter from one of the physicians of Eastport which read as follows:

"We are having quite an epidemic of diphtheria here in town, and but very little done to prevent its spreading. We have no board of health, excepting the selectmen, and they do not seem to take much interest in the matter Families that have diphtheria are allowed to go out and in just the same as though the disease was not there, and are allowed to come on to the streets and mingle with people the same as ever. I heard of a case of a little boy that was taken yesterday The father asked the doctor that is attending the child if he could go out the same as usual, and he answered him, yes, they were all going out, and he might as well as the rest.

"Within the last three days we have had six new cases reported and within the last week four deaths. Now I think something ought to be done and that right away, to prevent its spread. Calais says they will quarantine us if something is not done. I wish you would attend to this at once"

In answer to this the following letter was sent:

"DEAR DOCTOR:—I thank you very much for letting me know about the prevalence of diphtheria in your town. You need a local board of health at once, and ought to have one permanently. Please consult with the selectmen about appointing one If your

physicians do not wish to be troubled about such duties, advise the selectmen to appoint three good, trustworthy men who are not physicians, with or without a health officer, preferably, with, to advise them. It would be better probably, for the secretary to be chosen with reference to his being the executive officer of the board, doing most of the work and, of course, having most of the pay for work necessary to be done. Unless you have a board and begin work at once you will probably be quarantined against by more than one town. Calais looks after its cases of infectious diseases sharply, and will, undoubtedly, carry out its threats, and they ought to. I send you circulars, blanks, and other papers which please give to the local board of health when appointed.

If there is any hitch on the part of the municipal officers about making appointments, the State Board of Health will appoint at its next meeting, March 31, if citizens of your town will nominate suitable persons. I think, however, the trouble with the selectmen is that they have found difficulty in finding persons to accept, or so I have been informed."

With this letter was sent a full set of the blanks and circulars needed by a local board to begin and carry on its work. A letter was also sent to the selectmen urgently requesting them to appoint a local board of health. A local board of health was appointed March 27th, and organized and began work at once. One of the first things the board did was to request information of all the physicians in the town as to the number and location of the cases of diphtheria under their treatment. A, had two cases, both convalescent; B, two cases in one family, nearly well; C, no cases, just discharged last one, have had sixteen cases; D, one mild case.

From these reports, and from the length of time the disease had prevailed with no authority to restrict it, we may well infer that the number of infected places in the village was considerable, and that consequently the local board would work under many disadvantages. The board worked under other disadvantages also: some of the citizens showed a disposition to defy the authority of the board instead of supporting it in its work for the common good. For instance, about the middle of April, a case of diphtheria was reported to the local board of health in the house of a Mr. K. The Secretary went at once to the house and adopted measures to prevent the spread of the infection. The house was placarded. Three days afterwards complaint was made that the brother of Mr.

K., was disregarding the order of the board, visiting the house freely and taking no precautions. The Secretary called upon Mr. K., the brother, in relation to the matter and he acknowledged that he was doing so daily and should continue to do so, and a few hours afterwards, he went to the infected house, removed the placard from the door, and tore it in pieces. The local board promptly and rightly filed a bill of charges against Mr. K. Eventually the case was tried before a local justice, the defendant plead guilty, and was fined twenty-five dollars and costs. The defendant appealed to the Supreme Court, and the case was settled without being brought before the jury by his paying the costs, about seventeen dollars.

In spite of the earnest work of the local board of health new cases continued to appear nearly every week until the latter part of August; then on account of the continuance of the epidemic Dr. C. D. Smith of Portland, a member of the State Board, visited the town for the purpose of advising with the local board and learning the conditions which contributed to the continuance of the prevalence of the disease. The following was the doctor's report:

PORTLAND, August 23, 1890.

Dear Doctor Young:

I have this morning returned from Eastport and will report to you while the matter is fresh in mind.

I arrived at Eastport Thursday noon, and at once made an appointment to meet the local board that evening, as all were out of town at work during the day. I busied myself until night looking about the town and conversing with different citizens as to the past and present condition of affairs, and my interview with the board during the evening only confirmed the opinion I had formed during the day. I am satisfied that the cause of the trouble is due to these facts:

1. The present board entered upon its duties last spring without receiving any records from their predecessors. It does not appear that any were ever kept. They have adopted no formal by-laws, and have been continually hampered by the idea that they could do nothing unless it were in accord with something in the town by-laws.

2. They been deceived with regard to the presence of cases of diphtheria, because I find the impression prevalent that physicians have not reported all of their cases, and this is not contradicted by

evidence; indeed, I was assured by one physician that until last spring when the selectmen "asked" them to do so the physicians had not considered it at all worth while to report.

3. There has been and is a singular apathy in the minds of some of the people as to the danger of the disease, due to remarks freely made by some of the medical profession, creating the impression that the disease is feebly, if at all, contagious, and ridiculing the necessity of such stringent measures, as have been advised. This attitude of some of the medical profession has seriously impaired the usefulness of the board and embarrassed them and the selectmen in their endeavors to do their duty, as I believe they have honestly attempted.

4. The selectmen on their own responsibility, without consulting the board of health, appointed a Mr. Whelpley, an ex-deputy sheriff, as health officer, and the board tell me that for a fortnight at a time they would have no knowledge of where he was or what he was doing. Then the citizens rebelled against paying this man two dollars per day, and the selectmen dropped him. From what one of the physicians told me and from my conversation with prominent and reputable citizens, I have no doubt that the so-called isolation has been very feebly maintained.

During the evening I had a long conference with Mr. Clark, Secretary of the local board, and his associate Mr. Bibber, who was appointed in July to succeed Mr. Caldwell who took offense and resigned because his friend Mr. Kilby was prosecuted for tearing off a placard. I told the local board that having asked me what I considered the cause of the continuance of the disease, I should reply to them frankly. You have been working against great odds, because your local physicians have neglected to keep you fully informed of new cases, and because of prevailing false impressions as to the contagious character of the disease, and this latter has rendered your system of isolation almost of no avail.

I advised them to have a full meeting of their board to-day, and first of all adopt a system of by-laws and send it to Judge Emery for approval, making a careful record of everything done by them as a board. Then by careful and judicious inquiry keep themselves informed as to the progress of every case and the thoroughness of the isolation. They are to be careful not to interfere with any physician in the management of any case, unless satisfied that he is

deceiving them or that the measures of restriction fall short of those directed by the State Board.

I told them that when once appointed by the selectmen their duty was to administer the State health laws and their approved by-laws, entirely independent of anything or any body except their own decisions formed upon their own judgments in each particular case. That they must be the judges of their own action, and act accordingly. A question was here interposed by a physician present as to the need of certain cleansing methods in a "disease not yet proven to be contagious in all cases." I replied that I could not presume to occupy time to discuss that subject, or the question of contagion; that whatever his view or mine on that subject, one thing was plain, i. e., that the Law of Maine directed that when a case of diphtheria occurs, certain things must be done, by certain people and the duty of the local board of health was to see that such were done. That was the whole point of the diphtheria question, and there could be no other.

I discussed freely and until midnight with Mr. Clark, Secretary of the board, the various bearings of the question. I am satisfied that the board is anxious and desirous to do its whole duty and will if it has the support of the municipal officers. Mr. Clark is a young man, keen, careful and intelligent, and is surprisingly well posted on health regulations and the different circulars issued by our Board. Mr. Flagg is equally so and both will do all they can. Friday morning I had a long conversation with Mr. Norton, one of the selectmen. He confirmed my impressions regarding the cause of the trouble, and said that his board had again discontinued the services of the health officer, and that they had received the resignation of Mr. Clark, but did not wish to accept it because they had confidence in him, and in Mr. Flagg. I told Mr. Norton that I was satisfied that Mr. Clark would continue on the board, but that the board must have the support of the municipal officers and citizens and that no obstacle ought to be thrown in their way by cramping them in their necessary expenses. That if these gentlemen gave their time and received no compensation, the least the town could do was to give them the services of some one to do the work of placarding and attending to these cases of diphtheria when needful. I impressed upon him that anyone whom his board should select must act under the direction of the board of health and report to them. He assured me that all this would be done and that the selectmen would stand

behind the local board in every case. If all concerned do not now have a clear conception of their several duties in the premises it is their own fault. I am convinced that reporting all the cases, and anything like a decent quarantine would have prevented such serious trouble as they have experienced, but I was amazed to find how thoroughly disseminated were the doubts as to the contagious nature of the disease. There has been the trouble, and I am satisfied that a few judicious prosecutions would have changed the opinions of some of the people in a radical manner. I advised all whom I met, with a full understanding that the question in a small village has some features which may be ignored in the city, and think my instructions were adapted to the people and the place. I am confident that the local board can manage it if the physicians don't counteract their efforts. The board has the right idea and is anxious to do its duty to the satisfaction of the State Board.

The village seems clean and well kept, and the drainage, except about Water street, has plenty of chance to reach tide water by the natural decline of the land. On the water front there are a number of private drains. The water supply is good in quality, but somewhat limited in quantity, and it is now proposed to tap a pond some miles from the village and utilize the stand-pipe which has been built for a protection against fire. The local board is looking after the privies and the fish offal about the packing houses, and will do good work if not hindered.

Just as soon as I can get leisure I want to go to Augusta and tell you much that I can't very well write, but I have herein given you the gist of my labor which I hope will prove beneficial, and to your satisfaction.

Will you please mail to Mr. Clark, some copies for free distribution of circulars No. 38, 39, Notes on Disinfection, Abstract of Health Laws, Form 44, Form 11, and Form 12.

Very truly yours,

CHARLES D. SMITH.

This outbreak and continued prevalence of diphtheria in Eastport is another confirmation of the truths taught by the State Board that the infection of diphtheria once introduced and distributed in a village is an exceedingly hard one to eradicate, and that its introduction should everywhere and always be met by prompt measures to prevent its spread. In this case the golden opportunity for stamping out the epidemic had passed when the local board was

appointed; the further explanation why the disease still continued is given by Dr. Smith's letter.

SCARLET FEVER IN GUILFORD.

In the early part of October, I was notified by Mr. Henry Shaw, Secretary of the local board of health of Guilford, that some kind of eruptive disease prevailed in that town, and that there was a disagreement among the physicians who had seen the cases as to its nature, some contending that it was scarlet fever and some that it was not. As often happens, the citizens took side with the doctors, and, consequently, the local board of health was not supported as it to ought to have been in giving the public the benefit of the doubt until the question was settled. In this emergency the local board of health appealed to the State Board for advice, and Dr. J. O. Webster visited the town. As the difference in diagnosis in connection with this outbreak is fairly typical of some other differences of opinion that have arisen in other outbreaks of this same disease, the doctor's report should be of more than local interest, and should warn against the repetition of the error of demanding absolute certainty of diagnosis before anything is done. The mere suspicion that a given case is one of scarlet fever should always lead to prompt precautions against the spread of infection if it should prove to be infectious.

AUGUSTA, October 10, 1890.

Dr. A. G. Young, Secretary:

DEAR SIR:—In accordance with your request, I visited the town of Guilford, on the 9th inst., to investigate an epidemic of an eruptive disease there prevailing among children, there being a difference of opinion among medical men in that vicinity as to its nature. I was met at the station by Mr. Straw, Secretary of the local board, and taken to see a large number of cases.

The epidemic began with one or two cases in August, but did not spread to any extent until within the past two or three weeks, when there have been about twenty-four cases. As it had evidently been propagated through the schools, they had very properly been closed. The local board had used every effort to control the disease,

but had been hampered by medical opinions averse to its being of a serious character.

I submit some brief notes of a part of the cases that I saw.

1. Frank Washburne, age 5, on October 2d complained of sore throat in the morning, had nausea and fever in the afternoon, eruption began that night on the body, there was little on face. He is now desquamating, large flakes peeling from limbs and hands, and starting on feet; he pulled a "cot" from one finger while I was present Throat and nose quite sore.

2. Kate M. Richards, age 9, taken two weeks ago, vomited once then lay about the house two or three days and complained of sore throat, mother does not know when she broke out, eruption was fine, only on chest, now feels rough but is not yet desquamating.

Two other children in this family had slight symptoms, some sore throat, the older a fine eruption all over, the younger only on back of neck.

3. Harry Bonney was taken two weeks ago with vomiting and high fever, eruption was not noticed till the third day. It was fine with intense redness all over body, not much on face, very sore throat, had much swelling of glands and wry neck, now desquamating, neck still stiff.

4. Straw boy, taken two weeks ago, got up in the morning feeling sick and returned to bed, vomited and had high fever, throat sore, eruption appeared next morning it was fine with intense redness of skin, first on body but extended to cheeks and forehead. Now desquamating, pale and weak.

5. Hudson boy was taken with sore throat, vomiting, quite high fever, no eruption. He is supposed to have had scarlet fever when small. Sister was taken about a week later with same symptoms, a fine rash appeared in a few hours over body, not on face. Not yet desquamating, but skin is rough and looks likely to throw off scales.

I saw a good many others, some having had very little eruption or none at all, all having had fever and sore throat, and nearly every case beginning with vomiting. Several of the parents had had sore throat and a feverish condition.

Doubtless all these cases depended upon one and the same poison, and I have no hesitation in saying that it was that of scarlet fever. Although several of the cases, taken alone, would have furnished

no conclusive proof of their nature, there were enough quite typical cases to establish the diagnosis with absolute certainty.

Given an eruptive disease of children, the diagnosis lies between measles, German measles, and scarlet fever. The points relied upon for diagnosis, were as follows:

1. It began with fever and vomiting, followed by rash within—except in one case—twenty-four hours; in measles the rash would not appear until the fourth day, while in German measles there would be no fever previous to the eruption.

2. The eruption began on the body and rarely extended to the face, never occurring about the mouth;—in both measles and German measles the eruption is on the face from the first.

3. The eruption consisted of fine points, with redness of the intervening skin at first; characteristic of scarlet fever, and entirely different from that of the other diseases.

4. Desquamation followed in many cases; this does not occur in the other diseases, except a very limited branny desquamation in German measles when vesicles have formed. That found in these cases was characteristic.

5. The sore throat consisted of simple redness of the fauces and palate; that of measles and German measles, when present, is in the form of a coarse eruption, somewhat like that on the skin, extending to the hard palate.

Although the contagion is widely disseminated through the village, I believe the local board of health will now, supported by the authority of the State Board, be able to control its further spread. They are entitled to great credit for the energy with which they have grappled with the problem of its control, notwithstanding the unfortunate way in which they have been hampered in their action.

Yours truly,

J. O. WEBSTER, M. D.,

Member of the Board.

According to information received from the Secretary of Guilford the outbreak lasted about six weeks after the visit of Dr. Webster, and he thinks that six or eight new cases occurred, but as they were not willingly reported there might have been a larger number.

WATER ANALYSIS.

The demand for analyses of samples of water and for advice as to the suitability for drinking purposes of private and public supplies, present and prospective, has continued as hitherto, and as much work as has been practicable has been done in this direction. In the summer and fall the work on the State House extension interrupted the laboratory work considerably. The whole number of samples examined during the year is 96, of which fifty-nine were from wells, eighteen from springs, one from a cistern, five from public water supplies, thirteen from proposed sources of public water supplies, and two from samples of ice. Two samples of spring waters included in the foregoing are classified also as proposed public water supplies

The examination of samples of water is a work voluntarily assumed by the Secretary in 1887, with the approval of the Board. The examinations are willingly made, as far as the other work in the office will permit, and when there appear to be good reasons for requesting them. In addition to the lack of time always to attend to every examination as soon as the request is received, there has been the disadvantage of insufficient room to permit all the conveniences desired. This trouble it is believed will be obviated after the removal of the office into the new quarters assigned to it, one room of which is designed as the office for general work, and the other as the laboratory.

Circular No. 55 gives some information useful to those who contemplate sending samples. It reads as follows:

"To Applicants for Water Analyses:—The general work in the office of the Secretary of the State Board of Health necessarily takes precedence of the work of water analysis, therefore a delay in reporting results is sometimes a necessity. Where there appears to be a need of it, report is made at the earliest practicable moment.

"Notify this office when you wish to send samples, and bottles for that purpose will be sent in packing boxes. Samples sent without previous notification are almost invariably unsuitable and are necessarily thrown out without examination. Bottles are sent out free by express. Applicants must prepay return express charges.

"The analyses of samples of water ordinarily made require about half a day for each, and, in the doing of our somewhat routine

work in the examination of waters for the purpose of learning whether they contain polluting or other matters unfitting them as drinking waters, we always have rather more than we ought to do with the other work in the office. As the analysis of samples for the purpose of determining their medicinal qualities would take much more time, we were obliged to draw a line and exclude all this kind of work, and therefore, the laboratory has never been fitted up for it. If, therefore, the object in sending samples is to have their medicinal qualities determined, we shall be unable to do the work for you.

"If the object of the application is help in the choice of a public water supply, we would advise, by all means, the sending of more than a single sample from each place of collection. The quality of the water furnished by some sources of supply, or proposed sources, varies much at different seasons and during different sorts of weather. When practicable to do so, it is better to extend the examinations over as many months as possible, preferably a whole year, making arrangements to send samples every one or two months."

MISCELLANEOUS ANALYSES—Expressed in Parts per 100,000.

Number of Analysis.	Origin of Sample.	Date of collection.		Total solids.	Loss on ignition.	Hardness.	Chlorine.	Free ammonia.	Organic ammonia.	Nitrites.	Nitrates.
470	Well, Winthrop	Jan.	6	9.2	2.0	3.25	1.0	.000	.006	None.	Heavy trace
471	Spring, Belfast	"	6	12.8	5.0	9.57	.8	.000	.001	None.	Slight trace.
472	Spring, Bangor	"	6	18.4	3.2	15.63	.2	.001	.002	Trace.	V'y sl trace.
473	Spring, Bangor	"	10	16.2	5.4	14.06	.2	.002	.005	Slight trace.	V'y sl. trace.
474	Water Supply Company, Bath	"	11	3.2	1.6	1.27	.6	.000	.008	None.	V'y sl. trace.
475	Spring, Togus	Feb.	9	7.8	3.2	2.60	.6	.004	.004	None.	Heavy trace.
476	Well, Yarmouth	"	6	5.8	1.6	2.34	1.0	.001	.006	V'y sl. trace.	Trace.
477	Well, Bucksport			3.2	2.2	1.27	.6	.007	.028	None.	None.
478	Spring, North Raymond	Mar.	1	3.0	1.2	2.60	.2	.000	.001	None	V'y sl. trace.
479	Water Company, Phillips, Sandy river	"	2	2.4	1.4	1.27	.1	.000	.007	None.	None
480	Water Company, Phillips, spring	"	2	4.0	2.0	2.60	.1	.001	.004	None.	Trace
481	Well, Sanford	"	4	18.0	11.4	7.00	2.0	.000	.002	None.	Heavy trace.
482	Well, Palmyra	"	8	56.6	15.0	14.84	8.2	.013	.038	Very much.	Very much.
483	Well, Palmyra	"	8	9.0	3.6	5.29	1.0	.000	.004	V'y sl trace	V'y sl. trace.
484	Well, Cornish	"	29	14.0	5.6	4.57	1.8	.001	.003	Trace.	Heavy trace.
485	Sebasticook river, Pittsfield	"	29	4.6	4.2	2.60	.2	.001	.017	None	Slight trace.
486	Spring, Vinalhaven	Apr.	8	34.0	15.6	8.86	6.2	.000	.011	None.	Heavy trace.
487	Well, Liberty	May	13	48.6	14.2	23.60	4.0	.134	.030	Much.	Heavy trace
488	Well, East Livermore	"	17	29.6	6.0	8.86	3.0	.007	.027	None	Trace.
489	Spring, East Livermore	"	17	8.0	3.8	6.00	.5	.007	.004	None.	V'y sl. trace.
490	Well, Pittsfield	"	24	30.4	13.2	16.43	4.8	.004	.012	Trace.	Heavy trace.
491	Brook, Pittsfield	"	24	5.6	3.6	2.60	.0	.002	.030	None.	None.
492	Sebasticook river, Pittsfield	"	24	3.8	2.2	1.95	.0	.002	.015	None.	None.
493	Well, Alfred	June	5	-	-	6.00					

494	Well, Portland	June	14	14.0	9.0	4.57	1.4	.001	.002	None.	Slight trace.
495	Spring, Augusta	"	23	-		7.14	.3	.001	.001	None.	V'y sl trace.
496	Water Company, Richmond	"	26	4.0	2.2	1.95	.1	.000	.019	None	Trace
497	Water Company, Richmond	"	26	4.0	3.0	1.95	.1	.000	.015	None.	Trace.
498	Well, North Berwick	July	9	30.0	6.8	18.02	1.8	.003	.011	None	Trace.
499	River, North Berwick	"	9	4.0	2.8	1.69	.2	.008	.021	None.	V'y sl trace
500	Well, Welchville	"	10	27.0	4.2	3.25	.1	.022	.008	Trace.	V'y sl trace.
501	Well, Searsport	"	16	17.0	11.8	11.80	8.4	.003	.000	Trace.	Trace.
502	Well, Augusta	"	17	15.6	4.2	9.57	1.0	.000	.001	None.	None.
503	Spring, Greenville	"	18	5.0	2.2	5.29	.1	.000	.008	None.	None
504	Spring, Lewiston	"	23	5.2	2.4	1.95	.3	.001	.003	Slight trace	V'y sl trace.
505	Well, Buxton Center	"	21	16.0	3.8	5.29	2.2	.001	.006	Trace.	None.
506	Well, Norway	"	29	15.0	7.0	3.90	1.2	.000	.008	None	None
507	Well, Norway	"	29	16.8	7.8	7.43	.5	.001	.020	None.	None.
508	Well, Orr's Island	"	28	18.4	6.8	4.29	5.8	.000	.001	V'y sl. trace.	None.
509	Well, Welchville	Aug.	1	6.8	3.4	2.34	.2	.030	.008	None.	V'y sl trace.
510	Well, Sebago lake	"	6	6.4	3.2	2.60	1.2	.000	.000	None.	None.
511	Chapman brook, Bethel	"	9	2.8	.8	1.69	.1	.000	.003	None.	None.
512	Chapman brook, Bethel	"	9	3.0	2.0	.48	1	.000	.005	None	None.
513	Well, Yarmouth	"	12	13.4	3.2	9.57	1.0	.005	.001	None.	V'y sl trace.
514	Well, Gray	"	15	5.8	1.8	3.25	.8	.003	.001	None	None.
515	Well, Augusta	"	19	10.0	4.6	6.00	.4	.001	.002	None.	None.
516	Well, Augusta	"	19	19.2	8.8	10.30	.8	.003	.005	None.	None.
517	Spring, South Portland	"	21	14.8	8.0	6.00	2.8	.000	.000	None.	Slight trace
518	Spring, South Portland	"	21	12.2	4.2	3.90	1.6	.003	.003	Slight trace	None.
519	Well, Sherman Mills	"	19	19.4	6.8	10.30	.4	.000	.021	Trace.	None
520	Spring, Waldoboro'	"	24	5.0	1.8	.95	1.2	.001	.003	V'y sl. trace	None.
521	Well, Portland	"	24	17.4	8.2	5.00	2.0	.008	.009	Slight trace.	None
522	Lake Wasaukeag, Dexter	"	25	5.0	2.8	2.60	.2	.001	.012	None.	None.
523	Spring, Litchfield Plains	Sept	1	6.0	2.6	3.90	.4	.000	.002	None.	None.
524	Spring Fort Fairfield	Aug.	22	22.6	4.2	14.84	2.2	.010	.002	None.	V'y sl. trace
525	Ice from Nequasset lake	"	28	1.0	.6	.00	.1	.000	.002	None.	None
526	Ice from Goddard's pond	"	28	1.6	.8	.00	.2	.000	.000	None	None.
527	Well, East Machias	"	24	9.6	3.2	4.29	.6	.001	.003	None.	Heavy trace
528	Chapman brook, Bethel	Sept.	3	3.0	2.6	1.11	.1	.000	.007	Slight trace	V'y sl. trace.
529	East Branch, Baldwin	"	3	3.0	1.6	1.27	.1	.000	.006	None.	None
530	Well, Augusta	"	4	32.4	7.0	15.63	3.8	.021	.015	Heavy trace	Much.
531	Spring, Boothbay Harbor	"	3	7.6	1.8	4.29	1.0	.001	.003	V'y sl trace.	Slight trace.
532	Pond, Boothbay Harbor	"	3	6.8	4.4	1.69	.8	.009	.043	None.	V'y sl. trace

MISCELLANEOUS ANALYSES—Expressed in Parts per 100,000—CONCLUDED.

Number of Analysis.	Origin of Sample.	Date of collection.	Total solids.	Loss on ignition.	Hardness.	Chlorine.	Free ammonia.	Organic ammonia.	Nitrites.	Nitrates.
533	Well, Starks	Sept. 8	27.6	7.2	17.54	1.4	.001	.003	V'y sl trace.	Much
534	Well, North Islesboro'	" 10	35.8	6.0	16.11	7.2	007	.017	None.	Heavy trace.
535	Well, Islesboro'	" 9	22.4	6.2	14.37	1.4	.008	.022	V'y sl. trace	Slight trace.
536	Well, North Islesboro'	" 9	30.8	20.8	8.57	2.8	.000	.005	None.	Much.
537	Well, Sanford	" 13	21.4	11.6	3.90	2.0	.002	.007	Slight trace	Very much.
538	Water Company, Hallowell.	" 24	6.6	2.2	4.57	.4	.013	.006	Heavy trace.	Heavy trace.
539	Well, Hiram	" 24	3.8	1.4	2.34	.2	.003	.006	None.	Slight trace.
540	Well, Gorham	" 25	13.0	2.8	5.57	.7	.000	.015	None.	Trace.
541	Well, Portland	" 28	16.6	4.2	8.86	2.2	.073	.027	None.	Heavy trace.
542	Well, Fairfield	" 26	14.0	2.6	9.86	.6	.025	.008	Heavy trace.	Much.
543	Well, Winslow	" 29	35.4	9.6	16.11	6.0	.002	.011	Heavy trace.	Very much.
544	Well, Winslow	" 29	7.6	3.6	5.00	.6	.000	.000	None.	Much.
545	Well, Yarmouthville	" 30	70 4	11.8	19.13	5.2	.001	.038	None	Much.
546	Spring, Pownal	" 30	17.0	13.8	2.86	.6	.000	.000	None.	V'y sl. trace.
547	Well, Hiram	" 19	3.0	1.2	1.27	.3	.025	.006	None.	V'y sl. trace.
548	Well, Hiram	" 19	2.4	1.0	.95	.4	.000	.002	None.	None.
549	Well, Pittsfield	" 27	42.4	7.8	16.90	2.6	.000	.007	None.	Trace.
550	Well, Pittsfield	Oct. 27	21.6	4.8	18.02	.8	.017	.003	None.	Heavy trace
551	Well, Augusta	Nov. 3	17.2	6.0	11.05	2.0	.026	.006	V'y sl. trace.	Heavy trace.
552	Well, Sanford	" 1	32.0	12.2	10.30	4.8	.000	.009	V'y sl. trace.	Much.
553	Cistern, Portland	" 6	59.8	13 0	26.62	8.6	.002	.035	Very much.	Very much.
554	Well, Portland	" 5	7.8	2.6	3.90	.4	.003	.006	None.	Trace.
555	Well, Bethel	" 5	3.8	2.0	2.34	.6	.000	.005	None.	Trace.
556	Well, Madison	" 11	73.8	26.2	19.60	9.6	2.383	.023	Very much.	Very much.

557	Well, Pemaquid	Nov.	10	8.4	4.0	2.60	1.5	.005	.016	None	Much.
558	Sebasticook river, Pittsfield	"	16	5.0	3.2	2.60	.1	.004	.023	None.	V'y sl. trace.
559	Well, Pittsfield	"	17	5.6	1.6	3.51	.5	.000	.002	None.	Slight trace.
560	Well, Pittsfield	"	17	6.4	2.0	3.25	.6	.000	.000	None.	None.
561	Well, Kennebunk	"	28	18.0	7.0	12.26	1.6	.001	.012	None.	V'y sl. trace.
562	Well, Saccarappa	"	29	46.8	12.4	19.29	8.2	.000	.007	None.	Very much.
563	Well, Skowhegan	Dec.	1	15.6	.6	12.56	.4	.013	.002	None.	Slight trace.
564	Well, Madison			9.0	3.0	2.99	1.0	.000	.005	V'y sl. trace	Much.
565	Well, Lisbon Falls	"	9	4.2	1.8	2.34	.4	.002	.012	None.	V'y sl. trace.

NOTES ON SOME OF THE SAMPLES OF WATER EXAMINED IN THE LABORATORY.

No. 470. This sample was taken from an old well twenty feet deep. located 20 or 25 feet from the privy, and fifty feet from the stable. The report to the person who sent the sample said that "the sample is chemically a fairly good water. The nearness of the privy and even of the stable to the well is more suggestive of danger than the actual condition of the water as we find it now. The privy, especially, should be managed by some of the dry methods so that no soakage from it can find its way into the well."

No. 471. From a spring in the woods about a third of a mile from any buildings. This is a water very free from organic impurities, but considerably harder than the average of spring waters in the State.

No. 475. From a spring The blank accompanying the sample says that there is no privy "within thirty feet of the spring." If there is one not farther removed than this distance it undoubtedly accounts for the fact that the free and organic ammonia and even the chlorine are in excess of the average for spring waters in this State. The water cannot be considered a safe one for drinking purposes.

No. 478. From a spring issuing from a ledge. There are no sources of pollution in the vicinity. This is a very pure spring water and of a very desirable quality for drinking purposes.

Nos. 479 and 480. These two samples were sent by the Phillips Water Company for the purpose of enabling them to decide as to a suitable source for a public water supply. One sample was taken from Sandy river when the water was at medium height and the other from a spring on a hill side. The following report was made on the samples:

"I enclose blanks giving the results of the chemical examination of the two samples of water lately received from the Phillips Water Company. Looking at the results obtained, that is, judging from the chemical analysis alone, I should say that either source would furnish a good supply for drinking purposes. It is, very far from advisable, however, in choosing a source for a public supply to base the judgment upon the chemical examination alone and much

less upon the results of a single examination. I should, therefore, advise by all means the sending of other samples for examination at intervals of about four weeks and as long a time as the interval before beginning work will permit. It would especially be useful to you to have an examination made at the time of the spring freshet.

"I would say of the results of these examinations that the total solids, hardness, and free and organic ammonia, are all very satisfactory. The organic ammonia is especially low for a river water. The spring water has a little higher total solids, it is a little harder, and has a little more free and organic ammonia in it than is found in the very best of spring waters in this State, but not enough in it to justify me in calling it otherwise than a good spring water, especially without further examination of it. I would respectfully refer you to the report made last year on the examinations of the public water supplies in the State. You will perhaps be interested in comparing the results therein given with those which I give you with these two samples. I would gladly send you a copy of that report if the edition were not almost entirely sent out, and will do so, if you cannot borrow one from your local board of health."

No. 481. From a well dug twelve feet below the bottom of a cellar in which it is located. The well is in a thickly built part of the village with the sink drain, cess-pool, and privy from twenty to thirty-five feet distant. Typhoid fever and much other sickness has occurred in the families using this water, and the doctor has been called to them much oftener than to other families close by using the aqueduct water. The following report was made: "The well is badly located and even with the care which has apparently been taken with the well the cess-pools are much too near for safety. Under such conditions, almost always, we usually get more unfavorable results than I have with this sample, yet for Maine well-waters there is an excess of chlorine and nitrates which indicate a certain amount of pollution. I should feel very sure that at certain seasons, the water from this well would give much worse results than I have got from this sample. The examinations which I have made of the water supplied by the Sanford Water Company shows it to be good. The water from this well I should not want to use, basing my judgment rather more upon the description of the surroundings of the well than upon the chemical examination.

Nos. 482 and 483. These two samples were from two wells on the same premises.—No. 482. From a well eighteen feet deep at the corner of the woodshed, seventy-five feet from the sink drain, fifty feet from the privy and stable. Three years ago a pig-pen twenty feet from the well was removed The water was badly polluted and is not suitable for drinking purposes No. 483. From a well from two hundred to four hundred feet from the ordinary sources of pollution, nevertheless, the well is situated within the limits of the highway and is overflowed by surface water for a short time each spring. The well is only six feet deep. The chemical results at this time of the year are good. The sample from this well gave much the better results, though the well is badly located and should be protected from surface water if it is to be used. Two cases of typhoid fever have appeared in the family on these premises.

Nos. 485, 490, 491, 492, 558, 559 and 560. The analyses of these samples from various sources were made to aid in the selection of a suitable source for a water supply for the village of Pittsfield Nos. 485, 492 and 558 were taken from the west branch of the Sebasticook river flowing from Moose pond eight miles away. The stream has the drainage of Hartland village and of a five set woolen mill six miles up stream. No. 490 was from a well dug twenty-five feet, fifty feet from the privy and twenty from the stable. No 491 from a brook flowing through some marshy ground. No. 559 from a well drilled forty-seven feet in solid ledge. At this depth water was struck which flowed from the top of the well. There are no sources of pollution within 200 or 300 feet. No. 560 from a dug well forty feet deep, one hundred feet from privy, fifty feet from stable, and thirty-five feet from barnyard and pig-pen. The following report was made on these samples.

"I enclose three blanks giving the figures which we obtained from the analyses of the three samples of water lately received from you. I have also had tabulated for you, in pencil, the results of the analyses of all of the samples which you have sent. The sample from the Sebasticook river just examined gives results still more unfavorable than those given by the two samples previously received from the same source, as you will see by consulting the tabulation. The brook water sent me May 24th also gave unfavorable results due to the large quantity of organic ammonia, while at the same time the free ammonia was greater than the aver-

age in our public water supplies taken from rivers and streams. You will notice also that the sample of well water sent May 24th gave very unfavorable results.

"I am glad to say that the two samples of well water which you lately sent have given very good results. They are a little harder than the samples from the stream. Notwithstanding the good results which I get from the chemical examination of the water from the dug well my judgment would be that the well is not favorably situated for a public water supply. Your description of the surroundings indicates that sources of possible pollution are too near. On the other hand, as far as I can judge from the description of the drilled well, it is favorably situated and would not be likely to be polluted from privy soakage. There are of course important engineering questions and Mr. Gowing will answer these for you."

No. 486. A spring, or more properly, a public well, dug out eight feet deep. The ordinary sources of pollution about dwelling houses are not less than one hundred feet distant, but there is a cemetery only forty feet away, though it is said that the direct drainage from this is not toward the well. The rains all run into it from the valley above which is thickly settled. The water is polluted and is altogether unfit to be used as a drinking supply.

No. 487. The analysis was desired on account of the prevalence of typhoid fever in the house where it was used. From a well fifteen feet deep. Distance of privy twenty feet, stable and barnyard, sixteen feet, cess-pool ten feet. "The water is a bad one in every way, and is too dangerous ever to be used as a drinking water."

No. 488. From a well only eight feet deep, distant from the privy, stable, barnyard, pig-pen and sink drain forty-seven, thirty, forty-five, and ten feet, respectively. This water is distinctly polluted. It is much too near sources of pollution.

No. 489. From a spring 195 feet away from any buildings or other source of pollution, except surface water. This is not a good spring water.

No. 493. From a well drawn through thirty-five feet of lead pipe. It was tested for lead and hardness only. It contained a trace of lead.

No. 494. From a drilled well, forty feet deep, cemented around the surface of the ledge so that no surface soakage can get in. "The water is a very good and pure one for drinking purposes."

No. 495. A spring in a pasture forty rods from any dwelling. "If the cattle are kept away from the spring it will be a very good source for a drinking water supply."

Nos. 496 and 497. These samples were from the Richmond Water Company's supply, the one taken from the river, and the other from the tap, but there was nothing accompanying the samples to indicate which was which.

No. 498. From a well twenty-five feet deep with a ledge underneath inclining from the barn toward the well. Distance of privy from the well forty feet, stable eighty feet, and forty feet from an old barnyard. The water is polluted, though not largely so. "I should regard it as very probable that the polluting matter reaching the well, flows in on the surface of the well. I find quite often that this same condition of things carries the soakage from privies, barnyards, and similar places quite long distances and delivers it into the well."

No. 499. From a stream, the so-called Great Works river. The water is pumped into a large iron tank from which it is distributed to a number of houses. This sample contained a large excess of free ammonia and considerably more of organic ammonia than is found in the average of Maine river waters. Other samples were requested, but were not received.

No. 501. From a public well in the village. This sample has a large excess of chlorine, even for one near the seashore, and more free ammonia than it ought to have. A final report was not made as another sample and fuller information about the well were wanted.

No. 504. From a spring which furnishes the water supply of the Empire Grove campground in East Poland. It is reported that there have been various opinions as to the suitability of this water for drinking purposes ; some think that it has a laxative and diuretic effect. It is a good and pure spring water containing but little mineral matter and only a slight quantity of organic matter, and is moreover very soft for a spring water. The action of the water upon the bowels and kidneys is undoubtedly due simply to the fact that it is a pure and soft water. A sample received last year from the same source gave still more favorable results : total solids, 3.8 ; hardness, 1.95 ; chlorine, .2 ; free ammonia, .000 ; organic ammonia, .001.

Nos. 511, 512, 528 and 529. These samples were sent by the Bethel Water Company to help them in making a selection of a source for a public water supply. Nos. 511 and 529 were from the East Branch of Chapman brook, and Nos. 512 and 528 from Chapman brook.

The first two samples were collected August 9th, when there had been no disturbing rainfalls, and the second two samples collected September 3d, were taken just after a heavy rainfall. The two streams are mountain brooks fed very largely by springs, and the disturbing effect of the rainfall is shown to have been but very slight indeed

"As the figures stand for these analyses the results are rivalled by those from few of the public water supplies in this State as you can easily see by comparison with my report upon the public water supplies for 1888. If the quality of the water in those two streams remains as good for the whole year (and from your description of the conditions I do not see why it may not,) there can be no question that either would be a desirable source of drinking water supply."

No. 520 The reasons which led to the request for the analysis of the sample were similar to those given for No. 504. The sample was taken from a spring which serves as the water supply of a summer hotel, and some of the visitors complained that its use effected the bowels and kidneys. The water is very pure and remarkably soft. As to the possibility of the water containing any medicinal qualities or contents that might account for its effect upon the kidneys, the report on the sample said: "Its total solids are so small in quantity that I should hardly think it possible; on the other hand, I should incline to the belief that the increased action of the kidneys in the users of the water, is due to the softness and purity of the water." Nevertheless, it was deemed well to send a sample of the water to Professor Robinson of Bowdoin College, for the purpose of having an examination made of the constituents of the total solids. This was done and the Professor's results confirmed the opinion given in the foregoing.

No. 521. From a well sixteen and one-half feet deep, dug through six inches of soil and ten feet of seamy ledge then blasted six feet farther. The privy, a so-called earth closet, fifty feet distant and the cess-pool which is not a tight one only twenty-five feet away. The following is the report made of the sample:

"The enclosed blank will give you the results of the analysis of the sample of water lately received from you. The distance which separates the well from the privy and the sink drainage is too small, and possibly adding to the danger of the pollution of the well, are seams in the ledge. The chemical results are not favorable, for they show a moderate degree of pollution of the water. The discharge of the house drain into the cess-pool so near the well is not safe, and the privy should be of a kind that would absolutely insure against the soakage of it into the ground. Your earth closet if properly managed would give such protection. I should not consider the water from the well safe for drinking purposes, and if typhoid fever excreta should be discharged in the vicinity of the well, its use would be perilous. After boiling it would undoubtedly be safe.

No. 523. From a spring situated on the down-hill side from the house, but from 160 to 200 feet from the buildings and sources of pollution. Sickness has occurred in the family though not of a kind generally ascribed to impure water: "From the lay of the land, I should judge that there might be a possibility of soakage from sources of pollution into the spring, and it would be well to guard against anything of that kind. There is, however, in the results of the analysis nothing whatever to indicate pollution of the water, and the spring when this sample was taken from it at least, was furnishing a good and pure water for drinking purposes.

Nos. 525 and 526. Samples of ice sent by the local board of health of Bath. The following report was made:

"I enclose the results of the two samples of ice; nevertheless, I must caution you against drawing any conclusions from them. Ordinarily, in the process of freezing, water loses the larger part of both its dissolved and suspended matter, consequently, in the examination of samples of ice, we have to deal with very small quantities of total solids, organic matter, etc., and it might very easily happen, as the result of the different conditions under which the freezing takes place, that a sample of ice taken from the more impure of the two bodies of water would give better results than a sample of ice taken from the purer body of water. There would be many chances for self deception if one should attach too much importance to the results of examinations of single samples. I would, therefore, advise you to send samples of water from the two ponds by and bye, or about the time they are cutting the ice.

No. 530. From a well near an old tenement house in a thickly built up place. The ground is flat and rather wet, and privies and other sources of pollution are altogether too near. Much sickness has prevailed among the various tenants The water is unfit to drink and should never be used for that purpose.

Nos. 531 and 532. These analyses were made as an aid in finding a source for a village water supply. No. 531. From springs within 100 feet of a privy and stable. "From a chemical point of view this is a spring water of good quality for drinking purposes, nevertheless. sources of pollution are too near, and the danger of the soakage of polluting matter into the spring is too great to make this an advisable source for a water supply, especially for a public water supply. It is possible that the drainage could be disposed of through a perfectly tight iron drain so as to meet this objection."

No. 532. From a pond. "The results given are unfavorable to the water as a source of supply. No public water supply in the State has so large a quantity of the ammonias."

No. 533. From a well twelve feet deep, from 200 to 500 feet from sources of pollution. "It is a hard water, but otherwise chemically, there is nothing against it as a drinking water."

No. 534. From a well fifteen feet deep, dug four or five feet through a rocky loam then sunk the remaining depth by blasting into limestone ledge Sources of pollution are from 200 to 250 feet away. The water is polluted notwithstanding its considerable distance from sources of pollution. This well is an illustration of the fact that has been frequently observed, that wells dug through a rather thin layer of soil, and then into a ledge, often furnish waters that show evidences of pollution. Compare with Nos 521 and 535. This sample and the two following ones were sent by the Secretary of the local board of health of Islesboro.

No. 535. From a well ten feet deep, "dug through about a foot of heavy soil, sub-soil gravelly, mud and clay down eight feet, and then into a ledge two feet." Sources of pollution from ninety-five to 200 feet distant.

No 536. A well fourteen and one-half feet deep, dug "four feet through loose, sandy soil, then rocky, without much clay or pan." The privy, stable and sink drain are from ten to eighteen feet distant, nevertheless, the results obtained are much more favorable than from the two preceding samples. Evidences of a slight pollution are not lacking, however.

No. 538. From the public water supply of Hallowell. The results are not so favorable as were obtained from the examinations of that supply made in 1888.

No. 541. From a well eleven feet deep dug through "sandy loam two or three feet, then soft rock in layers, and when the depth of eleven feet was reached a stream of cold, clear water poured out of the seam in the rock and gave promise of an abundant yield which has been the case, but the water has had such an odor and taste that it has not been used." There did not appear to be sources of pollution near enough to the well to explain how the pollution occurs, nevertheless, the analysis shows that the water is very impure. The only theory to account for it is that the pollution is brought from a considerable distance through seams in the ledge.

No. 542. From a well distant from the sink drain, forty, from the privy, twenty, and from the stable and barn-yard, fifty or sixty feet. The character of the soil is a gravelly loam with a ledge beneath. There had been two cases of typhoid fever in the house, and there has been much sickness in this house previous to this. The following report was made: "The water of the well from which you sent the sample is badly polluted and must be considered dangerous for drinking purposes, and now, since there are cases of typhoid fever in the house, very dangerous "

No. 543. From a well thirteen feet deep, thirty-five feet from a privy, six feet from the stable and thirty-five feet from the barn-yard. "The well is much too near sources of pollution, and the water is badly polluted and not to be recommended for drinking purposes."

No 544. From a well eight feet deep in an open field 300 feet or more from any buildings The applicant says: "The only chance for pollution, is when the field is plowed and manure spread on the ground." Report was made as follows:

"I am glad that I am able to report favorably on this sample of water. It is of excellent quality in every way for drinking purposes and the only possible chance for polluting matter to reach the well, appears to be the one which you mention, and this I should consider very slight indeed if the well is so protected around the surface that the surface drainage cannot run in, and if you are careful not to spread the dressing within a few rods of the well. The constant running of the water from the well to the barn and house will have a tendency to improve, or rather to keep the qual-

ity good." A useful lesson may be learned by comparing No. 544 with No. 543.

No. 546. From a spring in a mowing field two hundred and fifty feet from buildings or sources of pollution. "The water is remarkably pure and free from organic matter and a good water for drinking purposes." This examination and No. 544 illustrate the fact that springs and wells in this State, when situated a considerable distance from sources of pollution, may almost always be counted upon to furnish good water for drinking.

No. 551. From a well thirty feet from the privy and stable and fifty feet from sink drainage. "The water is quite badly polluted and is not suitable for drinking. It may safely be used for cooking purposes if it is boiled in the process." A good example of a city well.

No. 552. From a well on level ground twenty-five feet deep, twenty feet from privy, four from stable, ten from pig-pen, etc "The evidences of pollution are very distinct and the water should not be used as a drinking supply. The sources of pollution are altogether too near to permit any sensible person for a moment to think of using the water." Sample sent by the Health Officer of the local board.

No. 553. Sample from a cistern ; distance from the privy twelve feet and from the sink drain and cess-pool ten or twelve feet. The cistern is sunk in the ground and so situated that surface water might run into it. The following report was made :

"The evidences of pollution in this sample are quite positive. The organic matter as indicated by the free and organic ammonia is not in excess of what is very often found in cistern waters, but the large quantity of chlorine and of nitrites and of nitrates are very unusual indeed in a cistern water, as is also the large total solids. As being of interest in this connection I would say that the nine cistern waters, the analyses of which are tabulated in the third, fourth and fifth annual reports, give an average total solids of 6.0, and of 26 as the average chlorine."

No. 554. From a well thirty feet deep through gravel underlaid with clay. The sources of pollution enumerated are the privy and stable, each 100 feet away, and the possible in-flow of surface water. Cases of typhoid fever have occurred among the users of the water. "From a chemical point of view this water is not objectionable as a drinking water, though there is a slight excess of free and organic

ammonia over what we find in the very best of well and spring waters."

VITAL STATISTICS.

An official registration of births, marriages and deaths in such a form as to make it furnish facts available and valuable for various purposes is considered so important a work that most civilized states and nations have not omitted to provide for it. Every other New England state has a record of vital statistics, and the purpose of the present report is to consider what use is made of such statistics, and why Maine needs such a system.

1. It would in many cases be of great service to our courts of justice. Before them the questions of heritage, and the legitimacy or illegitimacy of children are often coming. One of our State senators, at that time chairman of the Committee on Legal Affairs, stated that it once cost him fifty dollars to get the date of a birth. In Massachusetts a visit to the state capitol, or a letter sent there, suffices to obtain the date of any birth, and the parentage, within the period covered by the records,—almost fifty years now.

2 In the settling of pension claims, a similar use of vital statistics is made in those states where such records have been carried on long enough. The Hon. Henry B. Peirce, Secretary of the Commonwealth of Massachusetts, told the writer a few years ago that almost daily, pension claimants and their agents made use of the records under his care.

3. In the determination of the questions of citizenship and the legal rights of suffrage, an examination of the vital statistics record would determine when and where the would-be voter was born, if the event occurred within the state.

4. Vital statistics, when properly collected and recorded tell us, not only the number of deaths which occur in the state, the county, and the town, but also show us how many have died of consumption, how many from diphtheria, how many from cancer, how many from accidents, and so on through the list of the causes of death. They therefore furnish us with the means of comparing state with state, county with county, town with town, year with year, generation with generation. Trustworthy knowledge derived in this way is of the greatest help to the public health officer in determining the points in the state where redoubled sanitary effort needs to be made. Records of this kind for the sanitarian have well been compared to

the compass for the mariner. To other persons in making various kinds of investigations, a system of vital statistics is invaluable. Frequent enquiries come to the office of the State Board of Health of Maine, from persons in our own State or from without, for information on points which only a record of births, marriages and deaths could give.

5. The records of deaths and their causes are needed by the actuary, and in the interests of persons who wish to protect their dependencies or their business through life insurance. A while ago application was made to the Secretary of the State Board of Health by one of the leading insurance companies for information relative to the prevalence of pulmonary diseases in our State. It appears that the belief is widely extended, and it was so expressed in the letter, that lung diseases are especially prevalent "down east." We have no statistics with which to show whether this is an error or not. In the summer thousands of visitors attest to the healthfulness of the Maine climate. In winter the fact that the temperature is lower than in some other places is no sufficient basis for the opinion that the winter climate is insalubrious. Norway, in spite of its extending across the Arctic circle, has a lower death-rate than any other European country. As regards consumption, the most to be dreaded of all lung diseases, our neighboring state, New Hampshire, is able to show by its vital statistics that its death-rate from that disease is very low and hardly to be equaled in any other state, and a trustworthy record would probably show that the same is true of Maine.

6. In the study of political economy, vital statistics are of great worth, and to the legislator it is hardly conceivable that the records of the movements and principle events in the lives of the human population are of inferior value.

7. The provisions of modern laws for the collection of vital statistics are not without value for the prevention and detection of crime. Save in those few cases in which a coroner's inquest is deemed necessary, the law in our State interposes no official question nor restraint between the death of a citizen and his burial. In this direction we lack those wise statutory provisions which our neighboring states have. In Massachusetts such a trial as that of the Barron case, with its intricacies and dearth of scientific data as to the cause of death, could hardly occur.

8. A plea is justly made by horsemen, cattlemen and dog fanciers for more carefully kept pedigrees of the classes of animals in which they are interested. Nevertheless, the normally constituted man, that is, the average man, should have a deeper and more abiding interest in the human, than in any other animal. Therefore the events of human lives, the genealogical relationship of man to man and families to families, and the correct chronological determination of the principal epochs in the lives of persons has ever been regarded as subjects worthy of the attention of the best of minds. Upon the availability of such data depend the accuracy and the fulness of local or general history. We take pride in some of the work done in this direction within our own State, nevertheless our local historians have contended with many difficulties which a system of vital statistics would have lightened. The Maine Genealogical Society approved the vital statistics bill presented to the Sixty-fourth Legislature and desires its passage by the Sixty-fifth.

In accordance with the law establishing the State Board of Health which provides that they shall make "such suggestions as to legislative action as they deem necessary," the Board respectfully advises the passage of the bill to which reference has been made in the preceding paragraph, to wit: House Bill No. 27, An Act to provide for the registration of Vital Statistics, a bill which the last legislative body referred to the Sixty-fifth Legislature.

This bill was prepared by the Board of Health after due deliberation as to the needs of our own State, after an extended examination of the existing laws of other states, and after as careful a consideration as possible during several sessions of the full Board, of the character and tendencies of each section.

In accordance with the recommendations of the Board, and the wishes of many citizens of the State, the bill to which reference is made in the foregoing was enacted by the legislature after some changes. The following is the law, which, on account of the lateness of going to print, we are enabled to produce:

PUBLIC HEALTH LAWS OF 1891.

Chapter 118.

An Act to provide for the Registration of Vital Statistics.

Be it enacted by the Senate and House of Representatives in Legislature assembled, as follows:

SECTION 1. The secretary of the state board of health shall be the registrar of vital statistics for the state, and shall furnish to clergymen, and others authorized to marry, to sextons, to physicians, town clerks, clerks of the society of Friends, and to clerks of courts, a copy of this act, and suitable blanks for recording births, marriages, deaths and divorces, so printed, with appropriate headings, as readily to show the following facts and such others as may be deemed necessary to secure an accurate registration.

I. The record of a birth shall state its date and place of occurrence, full christian and surname, if named, color and sex of child, whether living or still-born, and the full christian and surnames, color, occupation, residence and birthplace of parents.

II. The record of a marriage shall state its date and place of occurrence, the name, residence, and official character of the person by whom solemnized, the full christian and surnames of the parties, the age, color, occupation, and residence of each, the condition, whether single or widowed, whether first, second or other marriage; and the full christian and surnames, residence, color, occupation, and birthplace of their parents.

III. The record of a death shall state its date, the full christian and surname of the deceased, the sex, color, condition, whether single or married, age, occupation, place of birth, place of death, the full christian and surnames and birthplaces of parents, and the disease or other cause of death, so far as known.

SECT. 2. The attending physician, accoucheur, midwife, or other person in charge, who shall attend at the birth of any child, living or still-born, within the limits of any town or city in this State, shall report to the clerk of such town or city within six days thereafter, all the facts regarding such birth, as required in section one of this act.

SECT. 3 Every person authorized to unite persons in marriage shall make a record of every marriage solemnized before him, in conformity with the requisitions prescribed for blank records of

marriages in section one of this act, and shall within six days thereafter, deliver or forward to the clerk of each town in which the marriage intention was recorded; a copy of such record of marriage.

SECT. 4. Whenever any person shall die, or any still-born child shall be brought forth in this state, the undertaker, town clerk, or other person superintending the burial of said deceased person, shall obtain from the physician attending at such bringing forth or last sickness, a certificate, duly signed, setting forth as far as may be, the facts required in the record of a death, according to section one of this act; and it shall be the duty of the undertaker, or other person having charge of the burial of said deceased person, to add to said certificate the date and place of the proposed burial; and having duly signed the same, to forward it to the clerk of the town or city and obtain a permit for burial; and in case of any contagious or infectious disease, said certificate shall be made and forwarded immediately.

SECT. 5. In the case of any deceased person not having had the attendance of a physician in his or her last sickness, the town clerk may issue and sign the certificate of death, upon presentation of such facts as may be obtained of relatives, persons in attendance upon said deceased person during said last sickness or present at the time of death, and the permit for burial shall be issued upon such information. Said certificate and permit shall not be required before burial in cases where it is impracticable to obtain the same within a reasonable time after death, but in all such cases, said certificate shall be obtained as soon as practicable after death.

SECT. 6. Parents shall give notice to the clerk of their city or town of the births or deaths of their children; every householder shall give notice of every birth and death happening in his house; the eldest person next of kin shall give such notice of the death of his kindred; the keeper of a workhouse, house of correction, prison, hospital, almshouse, or other institution, and the master or other commanding officer of a ship, shall give like notice of every birth or death happening among the persons under his charge.

SECT. 7. Except as provided in section five, no interment or disinterment of the dead body of any human being, or disposition thereof in any tomb, vault, or cemetery, shall be made without a permit as aforesaid, from the clerk of the town or city, nor otherwise than in accordance with such permit. No undertaker or other person shall assist in, assent to, or allow any such interment or dis-

interment to be made, except as provided in section five, until such permit has been given as aforesaid; and it shall be the duty of every undertaker or other person having charge of any burial place as aforesaid, who shall receive such permit, to preserve and return the same to the clerk of the town within six days after the day of burial.

SECT. 8. The town or city clerk shall appoint two suitable and proper persons, in each town or city, as sub-registrars who shall be authorized to issue burial permits based upon a death certificate, as hereinbefore provided, in the same manner as is required of the town or city clerk; and the said record of death upon which the permit is issued shall be forwarded to the town clerk within six days after receiving the same, and all permits by whomsoever issued shall be returned to the town clerk as required by section seven of this act. The appointment of sub-registrars shall be made with reference to locality, so as to best suit the convenience of the inhabitants of the town, and such appointment shall be in writing and recorded in the office of the town or city clerk.

SECT. 9. Town clerks and sub-registrars may issue burial permits to persons in contiguous towns, when by so doing it would be more convenient for those seeking a permit, but in all cases the permit shall be made returnable to the town clerk of the town in which the death occurred.

SECT. 10. The assessors shall, when taking the annual inventory, collect and return to the town clerk, before the first day of June, the births which have occurred within their respective jurisdictions, during the year ending December thirty-first next preceding, together with the names of such children.

SECT. 11. The clerk of every town shall keep a chronological record of all births, marriages, and deaths reported to him and shall annually, in the month of June, transmit a copy of the record of all births, marriages, and deaths occurring during the year ending December thirty-first next preceding such said report, to the state registrar, together with the names, residences, and official stations of all such persons as have neglected to make returns to him in relation to the subject matters of such records, which the law required them to make, all to be made upon blanks to be prepared and furnished by the state registrar.

SECT. 12. The clerks of courts for the several counties shall, annually, during the month of February, make returns to the

registrar of vital statistics in relating to libels for divorce in their respective counties for the calendar year next preceding. Such returns shall specify the following details: The number of divorces granted; and the names of the parties including the maiden name and any other former name of female, if any, when ascertainable.

SECT. 13. The state registrar shall cause the returns made to him in pursuance of the preceding sections eleven and twelve to be arranged, alphabetical indexes of all the names contained therein to be made, and the whole bound in convenient volumes and carefully preserved in his office. He shall annually make and publish a general abstract and report of the returns of the preceding year in such a form as will render them of practical utility, not more than one thousand five hundred copies of which shall be printed and bound in cloth, one copy of which shall be forwarded to every town, one copy to each senator and representative, one copy to each state and territory in the union, and the remainder to such departments, libraries, and persons as the state registrar shall direct.

SECT. 14. The sum of one thousand dollars per annum, or as much thereof as may be necessary, is hereby appropriated for printing and binding the circulars and blanks, for postage, and to defray the expenses of clerical work in carrying out the provisions of this act.

SECT. 15. The town clerk's record of any birth, marriage or death, or a duly certified copy thereof, shall be *prima facie* evidence of such birth, marriage or death, in any judicial proceeding.

SECT. 16. If any person shall willfully neglect or refuse to perform any duty imposed upon him by the provisions of this act, he shall be fined not more than one hundred dollars for each offense, for the use of the town in which the offense occurred. and it shall be the duty of the state registrar to enforce this section as far as comes within his power, and when the state registrar knows, or has good reason to believe, that any penalty or forfeiture under this act has been incurred, he shall at his discretion. forthwith give notice thereof, in writing, to the county attorney of the county in which said penalty or forfeiture has occurred, which notice shall state as near as may be, the time of such neglect, the name of the person or persons incurring the penalty or forfeiture, and such other facts relating to the default of duty as said state registrar may have been able to learn, and upon receipt of such notice the county attorney shall prosecute the defaulting person or persons.

SECT. 17. The clerk of each city or town shall be paid by such city or town for receiving, recording and returning the facts required to be recorded by this act, the sum of fifteen cents for each birth, marriage and death, and for each birth or death duly reported to the town clerk, physicians shall receive twenty-five cents from the town in which the birth or death has occurred.

SECT. 18 This act shall take effect and be in force on and after the first day of January, eighteen hundred and ninety-two, and all acts and parts of acts inconsistent with this act, are hereby repealed.

Chapter 82.

An Act to protect Waters used for Domestic Purposes.

Be it enacted by the Senate and House of Representatives in Legislature assembled, as follows:

SECTION 1. Whoever knowingly and willfully poisons, defiles or in any way corrupts the waters of any well, spring, brook, lake, pond, river or reservoir, used for domestic purposes for man or beast, or knowingly corrupts the sources of the water supply of any water company, or of any city or town, supplying its inhabitants with water, or the tributaries of said sources of supply in such manner as to affect the purity of the water so supplied, or knowingly defiles such water in any manner, whether the same be frozen or not, or puts the carcass of any dead animal or other offensive material into said waters, or upon the ice thereof, shall be punished by a fine not exceeding one thousand dollars, or by imprisonment not exceeding one year.

SECT. 2. Whoever shall willfully injure any of the property of any water company or of any city or town used by it in supplying water to its inhabitants, shall be punished by a fine not exceeding one thousand dollars, or by imprisonment not exceeding one year; and such person shall also forfeit and pay to such water company, city or town three times the amount of actual damages sustained, to be recovered in an action of the case.

SECT. 3. The provisions of all general laws, and of all special acts inconsistent with this act, are hereby repealed.

Chapter 115.

An Act for the Prevention of Blindness.

Be it enacted by the Senate and House of Representatives in Legislature assembled, as follows:

SECTION 1. Should one or both eyes of an infant become reddened or inflamed at any time within four weeks after birth, it shall be the duty of the midwife, nurse or person having charge of said infant to report the condition of the eyes at once to some legally qualified practitioner of medicine of the city, town or district in which the parents of the infant reside.

SECT. 2. Any failure to comply with the provisions of this act shall be punishable by a fine not to exceed one hundred dollars, or imprisonment not to exceed six months, or both.

SECT. 3. This act shall take effect on the first day of June, eighteen hundred and ninety-one.

Chapter 89.

An Act to amend section twenty-six of chapter twenty-six of the Revised Statutes, relating to Fire Escapes.

Be it enacted by the Senate and House of Representatives in Legislature assembled, as follows:

Section twenty-six of chapter twenty-six of the revised statutes is hereby amended, so as to read as follows:

'Section 26. Every public house where guests are lodged, and every building in which any trade, manufacture, or business is carried on, requiring the presence of workmen above the first story, and all rooms used for public assembly or amusement, and all tenement houses three stories in height where only one stairway or means of egress from the upper stories out of the building is provided, and all tenement houses of four or more stories in height, intended to be occupied by families, boarders or lodgers, above the third story, shall at all times be provided with suitable and sufficient fire escapes, outside stairs, or ladders from each story or gallery above the level of the ground, easily accessible to all inmates in case of fire or of an alarm of fire; the sufficiency thereof to be determined as provided in the following section.'

Chapter 47.

An Act to amend section nine of chapter fifteen of the Revised Statutes, relating to Burying Grounds.

Be it enacted by the Senate and House of Representatives in Legislature assembled, as follows:

Section nine of chapter fifteen of the revised statutes is hereby amended by inserting after the word "burying yard" in the second line, the words 'or incorporated cemetery or burying yard,' and by adding to said section the following words: 'nor shall any person, corporation or association establish, locate or enlarge any cemetery or burying ground by selling or otherwise disposing of lots, so that the limits thereof shall be extended nearer any dwelling house than twenty-five rods, against the written protest of the owner, provided, that nothing in this act shall prohibit the sale or disposition of lots within the limits of any existing cemetery or burying ground,' so that said section shall read as follows:

'Section 9. The municipal officers of any town, may on petition of ten voters, enlarge any public cemetery or burying yard or incorporated cemetery or burying yard within their town, by taking land of adjacent owners, to be paid for by the town or otherwise as the municipal officers may direct, when in their judgment public necessity requires it, provided, that the limits thereof shall not be extended nearer any dwelling house than twenty-five rods, against the written protest of the owner, made to said officers at the time of the hearing on said petition. Nor shall any person, corporation or association establish, locate or enlarge any cemetery or burying ground by selling or otherwise disposing of lots so that the limits thereof shall be extended nearer any dwelling house than twenty-five rods against the written protest of the owner, provided, that nothing in this act shall prohibit the sale or disposition of lots within the limits of any existing cemetery or burying ground.

Chapter 28.

An Act in relation to prosecutions for violations of municipal ordinances and by-laws.

Be it enacted by the Senate and House of Representatives in Legislature assembled, as follows:

In a prosecution in any municipal or police court for a violation of an ordinance or by-law of a city or town, or of any by-law of a village corporation or local board of health, it shall not be necessary to recite such ordinance or by-law in the complaint, or to allege the offense more particularly than in prosecutions under a general statute.

ADDITIONS TO THE LIBRARY.

During the year 1890 the following books, journals, and pamphlets were added to the library of the Board by exchange and purchase.

Books.

Index Catalogue of the Library of the Surgeon-General's Office. Vol. XI, 1890.

Richardson. The Health of Nations. Vols. I, II.

Pistor. Deutches Gesundheitswesen. Berlin. 1890.

First Report of the Royal Vaccination Commission. London. 1889.

Second Report of the Royal Vaccination Commission. London. 1890.

Gerhard. The Disposal of Household Wastes.

Leffmann and Beam. Examination of Water. Philadelphia. 1889.

Abel. Practical Sanitary and Economic Cooking. 1890.

Transactions of the Epidemilogical Society. London. Vols. 1 to VIII.

Eitner. Die Jugendspiele. Liepzig. 1890.

Preyer. Die Seele des Kindes. Leipzig. 1884.

Baumgarten. Jahresbericht ueber die Fortschritte in der Lehre von den Pathogenen Mikroorganismen. Braunschweig. 1888.

Orvananos. Ensayo de Geografia Medica Y Climatologia de la Republica Mexicana. Mexico. 1889.

Do. Atlas.

Uffelmann's Supplement for the year 1888.

Perier. Hygiene de l'Adolescence. Paris. 1891.

Coriveaud. Hygiene des Familes. Paris. 1890.

Guyot-Daubes. Physiologie et Hygiene du Cerveau. Paris. 1890.

Physical Training Conference. Boston. 1889.

Schulz. Impfung, Impfgeschaft und Impftechnik. Berlin.

Reports.

Eleventh Biennial Report of the State Board of Health of California. 1888–90.

Twelfth Annual Report of the State Board of Connecticut. 1889.

First Annual Report of the State Board of Health of Florida. 1890.

Fifth Annual Report of the State Board of Health of Kansas. 1889.

Ninth Annual Report of the State Board of Health of Illinois. 1886.

Tenth Annual Report of the State Board of Health of Illinois. 1887.

Biennial Report of the State Board of Health of Louisiana. 1888–89.

Twenty-first Annual Report of the Board of Health of Massachusetts. 1889.

Seventh Biennial Report of the State Board of Health of Maryland. 1886–87.

Eighth Biennial Report of the State Board of Health, Maryland. 1888–89.

Annual Report of the Board of Health of Missouri. 1888.

Eighth Annual Report of the State Board of Health, New Hampshire. 1889.

Thirteenth Annual Report of the State Board of Health, New Jersey. 1889.

Ninth Annual Report of the State Board of Health of New York. 1889.

Fourth Annual Report of the State Board of Health of Ohio. 1889.

Eighth Annual Report of the Provincial Board of Health, Ontario. 1889.

Third Annual Report, State Board of Health of Pennsylvania. 1887

Fourth Annual Report of the State Board of Health, Pennsylvania. 1888.

Twelfth Annual Report of the State Board of Health of Rhode Island. 1889.

Forty-eighth Registration Report of Massachusetts. 1889.

Thirty-first Annual Registration Report of Vermont. 1887.

Eighth Annual Registration Report of New Hampshire. 1887.

Transactions of the Medical Association of Alabama. 1889.

Transactions of the State Medical Society of Tennessee. 1889.

Twenty-second Annual Report of the Board of Education of Jersey City. 1889

Cameron. Report upon the State of Public Health in the city of Dublin. 1889.

Annual Report of the Maine State College, Agricultural Experiment Station. 1889.

Seventeenth Annual Report Lowell Water Board. 1889.

Twenty-seventh Annual Report Massachusetts Agricultural College.

Eighteenth Annual Report of Board of Health of Boston. 1889.

Annual Report of the Board of Health of Everett, Mass. 1889.

Annual Report of the Board of Health of Taunton. 1889.

Annual Report of the Commissioner of Health, St. Paul. 1889.

Fourteenth Annual Report of the Board of Health of Utica, N. Y. 1889.

Fifteenth Annual Report of the Board of Health of Newport, R. I. 1889.

Fifth Annual Report of the Board of Health of Portland. 1890.

Report of the Local Board of Health of Westbrook, Maine. 1889.

Second Annual Report of the Health Department of Mansfield, Ohio.

Seventh Annual Report of the Superintendent of Health of Providence, R. I. 1889.

Seventeenth Annual Report of the Board of Health of New Haven, Ct. 1889.

Report of the Board of Health of Hawaii on Leprosy, with appendix and supplement. 1886.

Annual Report of the School Committee of Lynn, Mass. 1889.

Biennial Report of the Board of Health of Hawaii. 1886.

Biennial Report of the Board of Health of Hawaii. 1888.

Biennial Report of the Board of Health of Hawaii. 1890.

Annual Report of the Board of Health, Columbus, Ohio. 1889.

Fourth Annual Report of the Board of Health of Hartford, Ct. 1889.

Fourth Annual of the Board of Health of Newark, N. J. 1888.

Biennial Report of the State Board of Health of Louisiana. 1888-9.

Sixteenth Annual Report of the State Board of Health of Minnesota. 1888.

Thirty-Fifth Annual Registration Report of Providence, R. I. 1889.

Tenth Annual Report of the Board of Health of Lynn, Mass. 1889.

Annual Report of the Board of Health of Manchester, N. H.

Sixth Annual Report of the Superintendent of Public Health, Providence, R. I 1888.

Report of the Fourth Annual Meeting of the Executive Health Officers of Ontario.

Report on the Sanitary State of the City of Montreal. Montreal. 1889.

Annual Report of Public Schools of Toledo, Ohio. 1885.

Toledo Public Schools. 1889.

Report of the Microscopists of the United States D
Agriculture. 1889.
Report of the Surgeon-General of the Army. 1890.
Report of the Commissioner of Internal Revenue. 18
Fifth Biennial Report of the Kansas State Histor
Topeka. 1887.
Annual Report of the Maine State College. 1888.
Report on an Endemic of Typhoid Fever, Springwate

SANITARY AND OTHER JOURNALS FOR 189

Index Medicus. Detroit and Boston.
The Sanitarian. Brooklyn, N. Y.
The Sanitary News. Chicago.
The Annals of Hygiene. Philadelphia.
The Engineering and Building Record. New York.
The Sanitary Record. London.
Public Health. London.
Building. New York.
Brooklyn Medical Journal. Brooklyn, N. Y.
Medical News. Philadelphia.
The Lancet. London.
The Microscope. Trenton, N. J.
The American Monthly Microscopical Journal. Wa
Archives of Pediatrics. Philadelphia.
Science. New York.
Medical Times. New York.
Journal of Comparative Medicine and Surgery. P
Canada Health Journal. Ottawa.
Occidental Medical Times. Sacramento.
Medical Standard. Chicago.
Medical Review. Pittsburgh.
Medical Times and Register. Philadelphia.
Anti-Adulteration Journal. Philadelphia.
Abstract of Sanitary Reports. Washington.
Revue D'Hygiene. Paris.
Journal D'Hygiene Populaire. Montreal.
Zeitschrift für Hygiene. Berlin.
Vierteljahrsschrift für offent. Gesundheits
Deutsche Medicinische Wochenschrift. Be

Zeitschrift für Schulgesundheitspflege. Hamburg.
Arbeiten aus dem kaiserlichen Gesundheitsamte. Berlin.
Centralblatt für Bakteriologie und Parasitenkunde. Jena.
Schweizerische Blatter fur Gesundheitspflege. Zurich.
Die Neue Deutsche Schule. Hamburg.
Giornale della Reale Societa Italiana D'Igiene. Milano.
La Salute Pubblica Perugia.
Public Health in Minnesota. Red Wing.
Monthly Bulletin of the Iowa State Board of Health. Des Moines.
Bulletin of the State Board of Health of Tennessee. Nashville.
Bulletin of the North Carolina Board of Health.
Monthly Bulletin of the State Board of Health of Connecticut.
Monthly Bulletin of the State Board of Health of Rhode Island.
Monthly Sanitary Record, State Board of Health of Ohio.

PAMPHLETS.

Atkinson. The Right Application of heating to the Conversion of Food Material Salem. 1890.
Baker. Malaria and the Causation of Intermittent Fever.
Clark. Faith Cure. Toronto.
———. Social Problems.
———. The Germ Army; how it may be routed.
———. Education in Relation to Health.
Corson. An Almost Unrecognized Cause of Disease in Young Children.
———. Pneumonia.
———. Our Hospitals for the Insane Poor.
Curtis. Trade and Transportation between the United States and Spanish America. Washington. 1889.
Derby. The Prevention of Near Sight in the Young.
———. Influence on the Refraction of Four Years of College Life. New York. 1880.
Enebuske. The Gymnastic Progression.
Featherstone. Ground Water and Shallow Wells.
Gerhard. Sanitary Condition of Watch Hill, R. I.
———. The Disposal of Sewage of Isolated Country Houses.
———. Not s on Gas Lighting and Gas Fitting.
———. Architecture and Sanitation.
Homan. Public Health and the Land Question.

Jacobson. Manual Training Schools. 1884

Kerlin. Provision for Idiotic and Feeble Minded Children.

———. The Moral Imbecile.

Martin. A pregnant Cause of Failure in Vaccination.

Mayo. Industrial Education in the South. Bureau of Education.

McMullen. Consumptive Travellers.

Porter. Report upon a Sanitary Inspection of Tenement Houses District of Boston 1889.

Rafter. Filteration of Sewerage

———. Biological Examination of Potable Water.

———. Fresh Water Algæ and their Relation to the Purity o Public Water Supplies.

Rauch. Water Supplies of Illinois. Springfield. 1889.

———. Report on Medical Education, Medical Colleges and th Regulation of the Practice of Medicine in the United States an Canada. 1765–1889

Reed. Slaughter Shops of Mansfield.

Remondino Longevity and Climate.

———. The Climate of Southern California, etc.

———. The Marine Climate of the South California Coas Phthisis.

Russell. Common Lodging Houses. Glasgow. 1889.

———. Fever and Small-pox Hospitals, Belvidere

———. "Ticketed Houses" of Glasgow.

Sarcey. Mind Your Eyes. Translated by H. D. Burns, M. D.

Taylor. Food Products. 1889.

Treat. Sanitary Entombment.

White. Ventilation of School Buildings.

Wiley. Lard and Lard Adulterations. Washington. 1889.

Woodbridge. A method of Warming and Ventilating Small School-Houses.

Behnke. Die Verbreitung der Lungentuberkulose durch Contagion.

Birch-Hirschfield. Die Bedeutung der Muskelübung. Leipzig. 1883.

Burgerstein. Die Gesundheitspflege in der Mittelschule. Wien. 1887.

Cohn. Beitrage zur Biologie der Pflanzen. Breslau. 1890.

——. Ueber d. Einfluss hygienischer Massregeln a. d. Schulmyopie. Hamburg. 1890.

Freire. Statistique des Vaccinations.

Hintrager. Volksschulbauten in der Schweiz und in Italien. Wein. 1889.

Hippel. Ueber den Einfluss Hygienischer Massregeln a. d. Schulmyopie. Giessen. 1889.

Lavrand La Fievre Typhoide. Lille. 1889.

Loewenthal. Hygiene des Unterrichts. Wiesbaden.

——. Grundzuge einer Hygiene des Unterrichts. Wiesbaden.

Tischler. Das landliche Volksschulhaus. Munchen und Leipzig. 1887.

Uffelmann. Hygienische Bedeutung des Sonnenlichts. Wien.

Von. Gossler. School-house plans prepared under the direction of the Minister of Public Instruction of Prussia. 1889.

Zimmerman. Die Bakterien unserer Trink und Nutzwasser.

Dei Doveri del Medico. 1890.

Dei Funghi Velenosi. Milano. 1890.

Verhandlungen des Internationalen Kongresses fur Ferienkolonien. Zurich. 1888.

Boletin de Consejo Superior de Salubridad. Mexico 1889.

Water Analyses. Minnesota Chemical Laboratory. 1879 to 1889.

Pennsylvania State Board of Health. Precautions against Consumption.

Regulation of Travel and Traffic.

The Dangers from Public Funerals.

The Disposal of the Sewage of Public Edifices.

Michigan State Board of Health. Restriction and Prevention of Diphtheria.

Iowa State Board of Health. Kerosene Oil; what to buy and how to use it.

Leprosy in Foreign Countries. Honolulu, H. I. 1886.

Summer Bulletin issued by Provincial Board of Health.

Circulars of State Board of Health of New Jersey.

Local Boards of Health of the State of New York.

Physicians in Pennsylvania. 1881–1888.

Bulletin of the Agricultural Experiment Station of Nebraska. June. 1889.

Sugar Producing Plants. Department of Agriculture.

Dr. Airy's Report to the Local Government Board on an Outbreak of Diphtheria at Coggershall in the Braintree Union, Essex.

Dr. Airy's Report to the Local Government Board on an Outbreak of Diphtheria at Great Dunmow.

Dr. Parson's Report to the Local Government Board on Outbreaks of Diphtheria at Hambledon and other places in the Droxford Rural Sanitary Districts.

Report of the Proceedings of the First Annual Convention of the North Carolina Sanitary Association, Raleigh, February 6–7, 1889.

Proceedings of the Quarantine Conference, Montgomery, Ala., March 5, 6, 7, 1889.

Proceedings of the Seventh Annual Meeting of the Ohio Sanitary Association. 1889.

Proceedings of the American Society of Microscopists. 1889.

Proceedings of the Seventh Annual Conference of the National Confectioners' Association.

Transactions of the Maine Medical Association. 1890. Vol. X.

Transactions of the New Hampshire Medical Society. Concord. 1890.

Minutes of the Dairy and Food Commissioners' Association. Cleveland, O. 1889.

EXPENSES OF THE BOARD.

The amount and character of the expenditures of the board for the year 1890 were as follows:

Engraving and drawing	$103 31
Books and sanitary journals	168 79
Instruments	142 80
Paper and stationery	168 95
Postage	200 00
Printing and binding	606 55
Secretary's salary	2,000 00
Expenses of members	457 28
Express and telegraph	216 67
Clerical help	741 00
Chemical and microscopical supplies	13 88
Hired or expert help	168 75
Miscellaneous	3 00
Total	$4,990 98

LOCAL BOARDS OF HEALTH

AND

EXTRACTS FROM THEIR REPORTS.

ABBOT.

Members of the board: W. W. Delano, Secretary; Chas. Foss, Chairman; James Greenleaf.

Two nuisances have come to the attention of the board, both of which were removed. We have had two cases of diphtheria and four of scarlet fever.

ACTON.

Members of the board: O. C. Titcomb, Secretary; C. N. Brackett, Chairman; B. J. Grant.

ADDISON.

Members of the board: F. A. Chandler, Secretary; H. N. Ingersoll, Chairman; N. W. Curtis.

ALBANY.

Members of the board: Daniel Clark, Secretary; Otis Hayford, Chairman; W. R. York.

A dirty condition of the privies exists in connection with the school-houses, all owing to the "cussed" district system.

ALBION.

Members of the board: Otis Meader, Secretary; R. L. Baker, Chairman; Dr. C. W. Abbott.

Two cases of typhoid fever have occurred, both of which were contracted out of town. Pneumonia was unusually prevalent in the

first quarter of the year as a result of la grippe. The sanitary condition of the town is good; the condition of the water supplies, cellars, and sink spouts should receive attention.

Alexander.

Members of the board: George B. Berry, Secretary; C. M. Huff, Chairman; Jonas A. Bohanon.

We have had no cases of infectious diseases. Influenza did not prevail to any extent in this town.

Alfred.

Members of the board: Dr. C. E. Lander, Secretary; S. M. Came, Chairman; Dr. J F. Day, Health Officer.

We have had two cases of typhoid fever, with one death.

Alna.

Members of the board: Dr. A. M. Card, Secretary and Health. Officer; B. W. Donnell, Chairman; A B. Erskine.

Four nuisances reported to our board were removed. We had one outbreak of scarlet fever, limited to one house and one case.

Alton

Members of the board: H. L. McKechnie, Secretary; Chas. Clayton, Chairman; A. J. Hatch.

We have had two cases of typhoid fever; one in each of two houses.

Amherst.

Members of the board: F. B. Foster, Secretary; N P. Sumner, Chairman; Fred Silsby.

We have had one outbreak of scarlet fever with two cases and one house infected.

Andover.

Members of the board: Geo. O. Huse, Secretary; Stephen Cabot, Chairman; Dr. W. Z Twitchell, Health Officer.

We have had two outbreaks of diphtheria confined to a single case in each of two houses.

Anson.

Members of the board: R. Fairbrother, Secretary; Byron Hutchins, Chairman; Dr. E. C. Andrews, Health Officer.

About a dozen nuisances were reported, all of which have been removed. There is a stagnant frog pond in the village at the east end of the iron bridge, which stands covered with green slime. It ought to be filled up or drained. In the nearest house to this stagnant pond there has been some one sick nearly all the time for the past eight years.

We have had two outbreaks of scarlet fever, both of which were confined to the first house. There were only three cases in all, and no deaths. One of the cases of scarlet fever was a curious one on account of its being a second attack of the same disease. It occurred in a boy thirteen years old who had the first attack of the disease when he was ten months old. In the first attack the boy was attended by a physician, and in this second attack the case was seen by the physician who is on the local board as well as by the attending physician, both of whom pronounced it scarlet fever.

Appleton.

Members of the board: Dr. F. A. Gushee, Secretary; A. A. Linnekin, Chairman; Samuel Ripley.

We have had no cases of the infectious diseases during the year. Many of the wells for family use are so located as to be exposed to drainage from barns, barnyards, barn cellars, privies, and sink drains. In some cases of dysentery which prevailed the well water was suspected of being the cause.

Argyle.

Members of the board: J. N. Tracy, Secretary; S. L. Freese, Chairman; J. M. Freese.

One nuisance reported to the board was removed. We have had no cases of the infectious diseases.

Arrowsic.

Members of the board: Jason McFadden, Secretary; T. J. Rairden, Chairman; C. T. Willis.

We have had no cases of the infectious diseases.

Ashland.

Members of the board: Charles L. Dunn, Secretary; L. C. Coffin, Chairman; Dr. E. A. Duren, Health Officer.

We have had two cases of typhoid fever. Whooping cough was quite prevalent.

ATHENS

Members of the board: Dr. H. C Taggart, Secretary; Dr. J. S. Tobey, Chairman; L. N. Ellingwood.

We have had no cases of infectious diseases except a few cases of whooping cough. There were about the usual number of cases of the diarrhoeal diseases.

ATKINSON.

Members of the board: G. W. Harvey, Secretary; E. W. Trask, Chairman; J. H. Ramsdell; Dr. E. P. Snow, Health Officer.

We have had no cases of infectious diseases. The general health of the town would be improved by personal attention to the laws of health.

AUBURN.

Members of the board: Dr. J. W. Beede, Secretary; Henry Lowell, Chairman; Daniel Lara.

Twenty-five nuisances have been reported to the board, seventeen of which were abated. Two localities containing tenement houses with no public sewers near are under slack management, always promising but never fulfilling.

We have had thirty cases of diphtheria with five deaths; eleven cases of scarlet fever, none of which resulted fatally; and twenty-four cases of typhoid fever with four deaths. In connection with outbreaks of infectious diseases the instructions given by the health tracts have been ordered carried out. In some of the outbreaks of diphtheria the secretary has ridden ten miles through some almost impassable roads to visit suburban districts. Whooping cough has been prevalent.

At the Webster grammar school-house, sewer gas escapes at somewhat rare intervals in a most disgusting manner. The schools have suffered but very little from contagious diseases. Children from infected houses have been kept at home.

AUGUSTA.

Members of the board: E. R. Bean, Secretary; Dr. J. O. Webster, Chairman; Dr. R. J. Martin, Health Officer; E. R. Bean, Sanitary Inspector.

The sanitary inspection provided for by the city government has proved of great value. The Sanitary Inspector last season visited nearly a thousand houses in the thickly settled portion of the city, and with his aid we were enabled to rectify 180 nuisances, remove forty-nine swine, move six families, and have four houses vacated because of their extremely unsanitary condition.

We have had ten cases of diphtheria, and about seventy-five cases of typhoid fever were reported to the board. Most of the cases of typhoid fever occurred during the winter. Besides typhoid fever, so-called winter cholera was quite prevalent

As methods of improving the healthfulness of this city. the extension and improvement of the sewerage may be recommended.

AVON.

Members of the board: J. A. Badger, Secretary; Joel Wilbur, Chairman; Benj. Butler.

We have had one case of typhoid fever.

BAILEYVILLE.

Members of the board: J. D. Lawler, Secretary; Jas. G. Smith, Chairman; Geo. W. Libby; Dr. J. M. N. Smith, Health Officer.

We have had no cases of infectious diseases. There were three or four cases of pneumonia in horses.

BALDWIN.

Members of the board: Chas. C. Rounds, Secretary; Lorenzo D. Norton, Chairman; Irving A. Chase.

Six nuisances have been reported to the board, all of which have been removed. One of the worst nuisances we have had to contend with has been the removal of dead carcasses, deposited where they ought not to have been.

We have had one outbreak of typhoid fever consisting only of a single case. For the improvement of the sanitary condition of the town, the condition of the wells and the sink drains should be improved.

BANGOR.

Members of the board: John Goldthwait, Secretary; Dr. D. A. Robinson, Chairman; Dr. G. M. Woodcock.

During the year about six thousand feet of sewers were constructed. One hundred and twenty-five formal complaints of nuisances have been made to the board, all of which have been removed or remedied as far as could be done.

We have had twenty-seven cases of diphtheria in sixteen different houses with eleven deaths; and fourteen cases of scarlet fever in eleven houses. There were fifty-five cases of typhoid fever with eighteen deaths. Diseases of this kind are looked after very promptly. In cases of diphtheria and scarlet fever we placard the house, furnish the family with circulars, report the case to the school agent, see that infected children do not go to school, and, in case of death, a strictly private funeral. and after the case is out of the way see that the house is fumigated and properly cleansed, remove the card and let the children go to school when the doctor says that it will do.

For improving the sanitary condition of the city I can only recommend to build sewers. and faithfully to continue hard work. We find the people more and more willing and ready each year to co-operate with us in trying to keep the city in a cleanly condition, and this is very encouraging to the board.

Baring.

Members of the board: S. P. Polleys, Secretary; Joseph Stevens, Chairman; J. F. Tyler.

We have had no cases of infectious diseases.

Bath.

Members of the board: Dr. Edwin M. Fuller, Secretary; Dr. R. D. Bibber. Chairman; James Bailey.

The year 1890-91 has been, on the whole, quite free from any severe form of epidemic disease. Whooping cough prevailed through the months of November and December, 1890, January and February, 1891, in a mild form. There were a few cases of scarlatina during September, October and November. The cases were quarantined and no epidemic resulted.

Nuisances. Many nuisances have been abated in various parts of the city. In most instances they have been abated without trouble; in a few instances matters have been pressed to a satisfactory adjustment. The dock at the foot of Linden street which

has been receiving large accessions of decaying vegetables, rubbish and garbage for a long time, in warm months is in a very unsanitary condition. We recommend that the accumulations in the vicinity of the fountain, at the foot of Linden street, be hauled away across the ice at once while it can be done at small expense.

Milk. The milk supply of the town is believed to be usually of a healthy quality. There are some practices prevailing among milkmen which, sooner or later, will endanger the health and lives of individuals who use their milk, viz: There are several who carry in their milk carts daily, either a "swill pail" or a "swill tub" often made of a "half barrel," in which swill is collected from house to house or at hotels. There are others who carry fresh meats for sale day after day in their carts, both of which are likely to impart their poisonous microörganisms to the milk and be introduced into the systems of those who consume the milk. Many epidemics in large cities have been traced to these practices before ordinances were framed to meet the cases.

This board is powerless to check the practice without some city ordinance concerning licenses of milk men, or the matter of carrying "swill" and "fresh meat" about town in a cart used to carry milk for public consumption. It is a nuisance that should be immediately abated. There is another very unsanitary practice carried on during the summer months among fish peddlers who go from house to house selling and cleaning fish upon the streets. The cleanings from the fish are thrown into the street, there to decay and furnish unwholesome odors to those who live in the vicinity. We recommend that some ordinances be framed to cover such cases.

Water Supply. The water supply has been ample, pure and clean most of the year. During the month of September it was very yellow in its physical appearance, and beginning about January 15, it became so again, believed to be due to faulty filtering at the pumping station, or the accumulation of a large amount of vegetable matter in the stand-pipe. It is recommended that the stand-pipe be thoroughly flushed at least once a year, under proper restrictions and notice to the public.

The ice supply has been pure and healthy. The following is the analysis of pieces of ice furnished to the State Board of Health.

From Nequasset Lake. (Parts in 100,000.) Date of collection, August 28; date of examination, September 3, A. M.; odor, none; color, none; total solids, 1.0; loss on ignition, .6; phenomena of

ignition, none ; total hardness, .00 : chlorine, .1 ; free ammonia, .000 ; organic ammonia, .002 ; nitrites, none ; nitrates, none.

From Goddard's Pond. (Parts in 100,000.) Date of collection, August 28 ; date of examination, September 3, A. M. ; odor, none ; color, none ; total solids, 1.6 ; loss on ignition, .8 ; phenomena of ignition, none ; total hardness, .00 ; chlorine, .2 ; free ammonia, .000 ; organic ammonia, .000 ; nitrites, none ; nitrates, none.

The drainage in various parts of the town is bad, and the attention of the city government cannot be too strongly called to the matter of beginning some systematic, intelligent effort toward the proper drainage of the city.

There are several hundred school children who have never been vaccinated. It is recommended that the teachers of the various schools be instructed to inform all scholars at the close of the summer term that, unless they present a certificate of vaccination at the beginning of the fall term, they cannot be admitted to school until such certificate is furnished.

Death Rate. Whole number of deaths from March 1, 1890, to February 28, 1891, was 216. Males, 102 ; females, 112 ; sex unknown, 2 ; strangers, 34 ; citizens, 182.

Death rate for the year, from March 1, 1890, to February 28, 1891, was 20 per 1,000.

BEDDINGTON.

Members of the board : A. F. Libby, Secretary ; W. A. Coffin, Chairman ; Eli Oakes.

We have had no cases of the infectious diseases.

BELFAST.

Members of the board : M. C. Hill, Secretary ; F. A. Rhoades, Chairman ; John R. Hurd.

One nuisance reported to the board was removed. We have had one outbreak of diphtheria, which did not spread beyond the first case. There has been very little for us to do this year, but we shall act promptly whenever occasion requires.

BELMONT.

Members of the board : Miles Pease, Secretary ; N. B. Allenwood, Chairman ; D. A. Greer.

We have had two outbreaks of diphtheria, consisting of two cases. In both outbreaks the disease did not spread from the house where it first appeared.

BENEDICTA.

Members of the board: John Rush, Secretary; John Doyle, Chairman; Michael Duffy.

We have had no cases of infectious diseases.

BERWICK.

Members of the board: Dr. P. B. Young, Secretary; C. M. Guptill, Chairman; Dr H. V. Noyes.

Eleven nuisances have been reported to the board, all but one of which were abated The nuisance not removed consists of a soap-house, built many years ago when there were but a few dwelling houses in the village, and where then it stood alone, and, it might be said, out in the country. On account of the gradual increase in the size of the village, it is now located in the central part of the place. and he has, surrounding it, three or four open hogyards. Taken as a whole, during hot weather, it is sometimes exceedingly offensive to the surrounding neighbors. The owner seems to think that he has gained his right of location by quiet possession, and I believe most of his neighbors think likewise.

We have had one case of typhoid fever and nine cases of diphtheria with three deaths.

The water supply of the village is very poor and a water company was formed to put in a new supply, but owing to the expense it proved a failure. It will undoubtedly be taken in hand again in the near future.

[One of the outbreaks of diphtheria occurred in a family that had recently moved from across the river in Great Falls, N. H, and the report states that the first case was not reported to the board by the attending physician It appears, furthermore, that while the attending physician assured the board that "all necessary measures of isolation and disinfection were being taken" the father had the care of the sick child, carrying it about in his arms until it was asleep and then laying it on the bed and going down stairs to take the baby and the other child in his arms without change of clothing. As the result, the disease was communicated to the other two children, both of whom died.—SEC. STATE BOARD]

Bethel.

Members of the board: Dr. C. D. Hill, Secretary and Health Officer; A. B. Godwin, Chairman; E. B. Goddard.

During the past year a fine system of water works has been introduced in our village, bringing the water from a distance of four miles. The source of the supply is a mountain brook, the waters of which are very pure.

Four nuisances were reported to the board, all of which were removed. We had three cases of typhoid fever in one house, causing one death. We had quite a number of cases of whooping cough. We need now a good sewerage system, and since the water works have been put in, we hope this may soon be accomplished.

Biddeford.

Members of the board: Daniel Cote, Secretary; Arthur Simpson; James Beaumont.

Bingham.

Members of the board: T. F. Houghton, Secretary; J. D. Merrill, Chairman; Dr. A. A. Piper, Health Officer.

One nuisance was removed. We have had one outbreak of scarlet fever, consisting of three cases, and there has been one case of typhoid fever.

Blaine.

Members of the board: John M. Ramsey, Secretary; F. L. Lowell, Chairman; Jonathan Hersom.

One nuisance was removed. We have had three cases of typhoid fever. With the exception of the prevalence of la grippe in the early part of the year there has been but little sickness. One of the cases of typhoid fever resulted, in our opinion, from water taken from a well near a barnyard. This case occurred in a large family, but no other member of the family took the disease. Privies and sink holes have been looked after carefully.

Blanchard.

Members of the board: E. P. Blanchard, Secretary; Chas. B. Packard, Chairman; Willis H. Knapp.

We have had no cases of the infectious diseases.

BLUEHILL.

Members of the board: Dr. R. P. Grindle, Secretary and Health Officer; A. C. Osgood, Chairman; R. G. Lord.

We have had one outbreak of scarlet fever confined to a single case, and five outbreaks of typhoid fever in five different houses, with six cases and one death. The diarrhoeal diseases of children have been unusually prevalent. For the improvement of the sanitary condition of the town I would recommend better ventilation in dwelling houses, school-rooms, and churches, and better drainage.

BOOTHBAY.

Members of the board: Dr. Alden Blossom, Secretary and Health Officer; J. R. McDougal, Chairman; Byron Giles.

We have had two outbreaks of scarlet fever in two houses with eight cases, and six outbreaks of typhoid fever with six cases and one death. Whooping cough was prevalent.

BOOTHBAY HARBOR.

Members of the board: Dr. F. H. Crocker, Secretary; Dr. J. A. Carter, Chairman; Wm. H. Reid.

BOWDOIN.

Members of the board: A. P. Small, Secretary; Abner Coombs.

Three nuisances were removed. Three outbreaks of typhoid fever occurred with three cases in all. Those having charge of the sick were cautioned to exercise care in the disposal of the excreta, and to prevent contagion if possible.

BOWDOINHAM.

Members of the board: Dr. I. C. Irish, Secretary; Dr. Chas. Lancaster, Chairman; L. D. Small.

Three nuisances were removed. We had five outbreaks of typhoid fever, consisting of six cases. Two deaths resulted from this disease. All cases of this kind are attended to promptly. Pneumonia has been unusually prevalent. Clean cellars, good drainage and a better management of the privies would conduce to the healthfulness of the place.

Bradford.

Members of the board: H. T. Williams, Secretary; D. S. Humphrey, Chairman; Dr. H. D. Worth, Health Officer.

We have had no cases of infectious diseases during the year. Our town is very healthy, and there have been but few deaths except from old age.

Bradley.

Members of the board: A. E. Perkins, Secretary; H. F. Brown, Chairman; J. N. Knapp.

Bremen.

Members of the board: Wm. B. Hilton, Secretary; Warren Weston, Chairman; Lauriston Little.

We have had three outbreaks of typhoid fever, consisting of only a single case in each instance. One of the patients died. Measles has been prevalent and there have been some cases of pneumonia. The removal of hog-pens and privies from the vicinity of wells, I would suggest, as a means of improving the sanitary condition of the town.

Brewer.

Members of the board: W. H. Gardner, Secretary; Dr. I. Getchell, Chairman; E. A. Stanley.

During the year we have built about three thousand feet of sewers and in most cases the owners of buildings on the extension have entered them. Six or eight nuisances were reported to the board and all were removed as far as possible. We have had five cases of diphtheria, all of which recovered, and eight cases of typhoid fever with one death resulting. No disease has been unusually prevalent. The few cases of diphtheria were sporadic and of very mild form. For the improvement of the sanitary condition of the town a still further extension of the sewers and the disposal of the wastes from sinks and privies by entering them is to be recommended. Two deaths resulted from accidents, one by the falling of a staging, and the other from the premature discharge of a gun.

Bridgewater.

Members of the board: R. H. Perkins, Secretary; Chas. Kidder, Chairman; Thos. G. Durgin.

Three nuisances have been removed and we have had two cases of typhoid fever, one in each of two houses. One of the cases ended fatally.

BRIDGTON.

Members of the board: S. S. Fuller, Secretary; P. P. Burnham, Dr. H. A. Lombard.

Two nuisances reported to the board were removed. We have had typhoid fever in two houses, one case in each. One of the cases ended fatally. We have lately had a case of glanders in a horse. The case was investigated by the cattle commissioners, and the horse was killed.

BRIGHTON.

Members of the board: L. D. Mathews, Secretary; Asa Strickland, Chairman; G. C. Davenport.

BRISTOL.

Members of the board: S. N. Smith, Secretary; George Johnston, Chairman; Dr. S. W. Johnson.

We have had two houses infected with scarlet fever, one case only in each house. Whooping cough has been quite prevalent, but it was in a very light form.

BROOKLIN.

Members of the board: E P. Cole, Secretary; George R. Allen, Chairman; Dr F. S. Herrick, Health Officer.

We have had no cases of infectious diseases, excepting a few of whooping cough, all confined to school district number one. One small child died. The board has had no occasion to act during the year, but is always ready.

BROOKS.

Members of the board: M. J. Dow, Secretary; I. G. Reynolds Chairman; Dr. A. W. Rich, Health Officer.

No cases of infectious disease have been reported to the boar

BROOKSVILLE.

Members of the board: Dr. F. E. Nye, Secretary and Hea Officer; Capt. J. Jones, Chairman; S. D. Gray.

We have had one case of typhoid fever, but the disease did not spread even in the same family. It has been exceptionally healthy during the past year.

Brookton.

Members of the board: N. A. Clark, Secretary; A. O. Fish, Chairman; G. A. McCluskey.

We have had one outbreak of scarlet fever in which nine houses were infected, and thirty-one cases occurred. Four deaths resulted. Otherwise than this outbreak we have had no cases of the infectious diseases.

The fact of our having so many cases of scarlet fever was due to taking the body of a child that died with this disease to a meeting-house and opening the casket there.

You will see by this report there have been more cases of scarlet fever in this town than you find on my weekly reports. I have gone to each house known to have been infected before we were appointed a board and had the number of cases from the heads of the families, and put them in the report.

[It should here be stated that this outbreak caught the town with no local board of health, that the Secretary of the State Board was notified about the same time by three physicians in three neighboring towns of the outbreak of scarlet fever in a malignant form, and that a telegram was sent to Dr. M. L. Young, Health Officer, of Vanceboro, to visit the place. He did so, and had a local board of health appointed. The board went to work earnestly and faithfully, and stamped out the outbreak in a remarkably short space of time, considering the disadvantages under which the board began its work.—Sec. State Board.]

Brownfield.

Members of the board: S. G. Boynton, Secretary; Albert Blake, Chairman; Dr. H. F. Fitch.

We have had one case of typhoid fever. The diarrhœal diseases of children were quite prevalent. Several low marshy places in the town have a tendency to render their localities unhealthful.

Brownville.

Members of the board: T. S. Pratt, Secretary; G. G. Brown, Chairman; M. S. Berry.

We have had one case of diphtheria and three mild cases of scarlet fever.

Brunswick.

Members of the board: Dr. M. V. Adams, Secretary; F. H. Wilson, Chairman; W. O. Peterson.

About the usual number of nuisances were removed. Cases of infectious diseases not having been reported, I cannot give the number. A system of sewerage is much needed.

Buckfield.

Members of the board: Dr. J. F. DeCoster, Secretary; Dr. J. C. Caldwell, Chairman and Health Officer; H. D. Irish.

Measles and whooping cough have been prevalent, but we have had no cases of the specified contagious diseases. One death from a severe burn occurred. A child four years of age had its clothes catch fire from the cooking stove.

Bucksport.

Members of the board: Dr. G. H. Emerson, Secretary and Health Officer; G. W. McAllister, Chairman; E. A. Crocker.

Two nuisances reported to the board were removed. We have had diphtheria in two houses with five cases; one case of typhoid fever in each of two houses. There was very little sickness during the year. We need a system of sewerage. One death resulted from a railway accident.

Burlington.

Members of the board: J. W. Bradbury, Secretary; Thos. Shorey, Chairman; Mellen Strickland.

Three cases of typhoid fever have occurred.

Burnham.

Members of the board: Dr. W. H. Merrill, Secretary and Health Officer; Walter Edmunds, Chairman; N. E. Murray.

No cases of infectious diseases have been reported to the board.

Buxton.

Members of the board: Dr. C. A. Dennett, Secretary and Health Officer; Chas. Hobson, Chairman; J. H. Waterman.

Six nuisances reported to the board were removed. We have had no cases of infectious diseases, except one of scarlet fever. I have no particularly unhealthy localities to report, excepting a "bog hole" at West Buxton. The selectmen have been notified in regard to it and promise to remedy the trouble by drainage, in the spring.

BYRON.

Members of the board: H. H. Richards, Secretary; G. F. Thomas, Chairman; A. S. Young.

Whooping cough was prevalent, but otherwise we have had no cases of infectious diseases.

CALAIS.

Members of the board: Dr. D. E. Seymour, Secretary; C. Ellis, Chairman; Dr. E. H. Vose.

Eighteen nuisances were reported to the board, but the number coming under the observation of the board and removed has been forty-nine.

We have had one case of scarlet fever and one of typhoid fever, both non-fatal; three outbreaks of diphtheria, sixty-six cases, thirteen deaths, and thirty-three houses infected.

Two deaths resulted from drowning. We have had two or three cases of glanders in horses, all of which were killed as soon as the nature of the disease was determined.

CAMBRIDGE.

Members of the board: J. B. Labree, Secretary; J. W. Cole, Chairman; G. E. Bailey.

One nuisance reported to the board was removed. We have had one case of typhoid fever.

CAMDEN.

Members of the board: J. P. Wellman, Secretary; Abel Merriman, Chairman.

Four nuisances were reported to the board, but only two of these were found to be such in fact. These two were abated. We have had one case of diphtheria; typhoid fever, three outbreaks, three cases, three houses infected.

CANAAN.

Members of the board: Dr. Ivory Lowe, Secretary; Dr. L. W. Sloan, Chairman and Health Officer; David Nason.

We have had one case of diphtheria. Whooping cough has been prevalent. We have no unhealthy localities to report.

CANTON.

Members of the board: H. T. Tirrell, Secretary; R. A. Barrows, Chairman; Dr. L H. McCollister.

Three nuisances have been removed. We have had six cases of typhoid fever. Whooping cough was prevalent and the diarrhœal diseases of children in their season.

CAPE ELIZABETH.

Members of the board: T. B. Haskell, Secretary; Dr. J. W. Lowell, Chairman; Dr. S. B. Thombs.

One nuisance was abated by the board. We have had three cases of diphtheria, one of scarlet fever, and one of typhoid fever. One school-room became infected and we thoroughly disinfected it and burned the books that had become infected.

CARIBOU.

Members of the board: Dr. J. Cary, Secretary; Rev. C. E. Young, Chairman; C. B. Roberts.

Eight nuisances reported to the board were abated. A spring in the village that had for some years been a source of typhoid fever, has finally been covered.

Diphtheria, three outbreaks, seven cases, and four houses infected; typhoid fever, seven outbreaks, nine cases, and seven houses infected.

I know of no particularly unhealthy localities except, perhaps, a part of Water street that is but little above the surface of Caribou stream, where croup has been prevalent in years past. The death of a little boy occurred as the the result of accidental shooting.

CARMEL.

Members of the board: F. A. Simpson, Secretary; Henry Kimball, Chairman; W. A. Swan.

Two nuisances have been abated by the board. Scarlet fever, two outbreaks, four cases, two houses infected. Whooping cough has been prevalent. Improved drainage would add to the health of the town. A child one year old was killed by the upsetting of a

child's carriage; and one death occurred from suicide, a boy fourteen years of age. There were during the year 20 deaths in all: nine of old age (over 80 years old), six of consumption, (ages from 30 to 74), two of paralysis, one of disease of the heart, one suicide and one accident.

Carroll.

Members of the board: Albion Gates, Secretary; W. A. Farrar, Chairman; D. W. Danforth.

Diphtheria, one outbreak, five cases, two houses infected; scarlet fever, one outbreak, seven cases, three houses infected; typhoid fever, one outbreak, consisting of a single fatal case.

Carthage.

Members of the board: S. C Morse, Secretary; W. W. Goodwin, Chairman; J. S. Swett.

We had one case only of diphtheria. We had all persons kept away from the house, except those who took care of the patient. The house was thoroughly disinfected after the recovery. A cough resembling whooping cough was prevalent, but it was not so called by physicians.

Casco.

Members of the board: L. W. Holden, Secretary; H. B. Harmon, Chairman; Samuel Winslow.

We have had two cases of diphtheria and two of scarlet fever, no deaths resulting. These cases have been attended to in accordance with the requirements of the law.

Castine.

Members of the board: Dr. G. A. Wheeler, Secretary and Health Officer; Curtis Stevens, Chairman; Dr. Edward Philbrook.

Four nuisances were removed by the board. We have had one case only of diphtheria, and none of scarlet fever or typhoid fever. The diarrhœal diseases of children were quite prevalent. With the exception of influenza there has been less general sickness in town than in any other year within the past twenty years. While *la grippe* prevailed in my own house, my horses and dog had the disease.

Centerville.

Members of the board: J. H. Floyd, Secretary; B. L. Drisco, Chairman; H. W. Foster.

We have had no cases of infectious diseases.

Charleston.

Members of the board: Dr. G. D. Cook, Secretary and Health Officer; W. E. Dunning, Chairman; O. L. Smith.

We have had no cases of infectious diseases, excepting two outbreaks of typhoid fever, consisting of a single case in each instance. One woman was burned to death by her clothes taking fire from the cooking stove.

Charlotte.

Members of the board: F. J. Sprague, Secretary; H. W. Stuart, Chairman; D. J. Fisher.

Our board stands ready to attend to whatever needs our attention, but during the past year we have had nothing to do. There have been no cases of infectious diseases.

Chelsea.

Members of the board: A. N. Douglass, Secretary; A. A. Sampson, Chairman; W. T. Searls.

Four nuisances were reported to the board, all of which were abated. Whooping cough has been prevalent, but otherwise there have been no cases of the infectious diseases.

Cherryfield.

Members of the board: Dr. C. J. Milliken, Secretary; Samuel Ray, Chairman; S. M. Inman.

We have had one case only of diphtheria, and one of typhoid fever. Whooping cough has been prevalent.

Chester.

Members of the board: J. D. Kyle, Secretary; A. Libby, Chairman; E. L. Keen.

We have had no cases of infectious diseases. There were two deaths from pneumonia. One of the persons was aged and the other middle aged.

Chesterville.

Members of the board: Dr. B. F. Makepeace, Secretary; T. J. Clough, Chairman; L. J. Keith.

China.

Members of the board: Dr. J. J. Nelson, Secretary; E. M. Dowe, Chairman; C. E. Dutton.

We have had one case of scarlet fever, and four cases of typhoid fever. During the latter part of the influenza epidemic, jaundice was prevalent, confined to children chiefly. I think *la grippe* is mildly contagious, with a period of incubation of seven or eight days.

A better arrangement of privies and the location of wells farther from barnyards would be a sanitary improvement. By-laws have been adopted by the board, and copies of them have been forwarded to the office of the State Board.

Clifton.

Members of the board: W. D. Campbell, Secretary; F. W. Bowden, Chairman; H. G. Doble.

We have had one case of typhoid fever.

Clinton.

Members of the board: Dr. G. F. Webber, Secretary and Health Officer; J. M. Winn, Chairman; R. B. Wells.

We have had no cases of infectious disease, except one of typhoid fever.

Columbia.

Members of the board: J. E. Stewart, Secretary; A. Leighton, Chairman; A. J. Tabbutt.

We have had no cases of infectious diseases, as we are glad to report.

Concord.

Members of the board: E. O. Vittum, Secretary; Amon Savage, Chairman; C. R. Ellis.

No cases of infectious diseases have come to the knowledge of the board.

Cooper.

Members of the board: Eugene Leland, Secretary; David Howe, Chairman; Wm. W. Sadler.

We have had no cases of contagious diseases.

Corinna.

Members of the board: J. P. Curtis, Secretary; E. Folsom, Chairman; A. K. Currier; Dr. O. H. Merrill, Health Officer.

We had some cases of pneumonia but no cases of infectious diseases occurred. For the village better sewerage and a better water supply are needed.

Cornish.

Members of the board: F. C. Small, Secretary; Dr. Wm. Swasey, Chairman and Health Officer; Benj. F. Haley.

Three nuisances were removed. We have had two cases typhoid fever.

Cornville.

Members of the board: S. S. Woodman, Secretary; C. E. Smith, Chairman; C. C. Kinsman.

We removed one nuisance, and have had one case of diphtheria.

Corinth.

Members of the board: Dr. E. H. Stanhope, Secretary and Health Officer; I. W. Davis, Chairman; C. H. Philbrook.

Cranberry Isles.

Members of the board: Wm. P. Preble, Secretary; T. H. Stanley, Chairman; John Gilley.

We have had one case of typhoid fever.

Crawford.

Members of the board: J. P. Jeffery, Secretary; N. S. Fenlason, Chairman; Robt. Wallace.

Two deaths occurred from scarlet fever, but the cases were not reported to the local board of health.

Cumberland.

Members of the board: Dr. C. T. Moulton, Secretary and Health Officer; A. H. Grannell, Chairman; L. H. Merrill.

We have had no cases of the infectious diseases, excepting one of diphtheria which ended in recovery. Pneumonia was somewhat prevalent, and a few cases of this disease have appeared in animals.

Cushing.

Members of the board: A. R. Rivers, Secretary; F. C. Hathorn, Chairman; W. A. Rivers.

No cases of infectious disease have appeared in town.

Cutler.

Members of the board: C. G. Aldrich, Secretary; M. W. Ackley, Chairman; O. A. Davis.

No cases of infectious diseases have come to the knowledge of the board. Whooping cough, or a disease resembling it, has been prevalent.

Damariscotta.

Members of the board: A. H. Snow, Secretary; Dr. E. F. Stetson, Chairman.

Three nuisances were reported to the board, one of which was abated. We had an outbreak of scarlet fever in which thirty cases occurred with no deaths, and twelve houses were infected. The mildness of the scarlet fever made it quite puzzling at first. The schools were closed on account of the outbreak. Better drainage is needed.

Danforth.

Members of the board: Dr. M. L. Porter, Secretary; C. H. Merrill, Chairman; James Carson.

Twelve nuisances were removed by the board. We have had no cases of the infectious diseases, except an outbreak of scarlet fever, in which thirty-four cases occurred. This outbreak necessitated the closure of the schools. Better sewerage is needed.

Dayton.

Members of the board: Dr. Geo. Sylvester, Secretary and Health Officer; Albert Dow, Chairman; Cyrus Ricker.

We have had one case of diphtheria and one of scarlet fever. Strict precautions were taken in these cases against the spread of the infection. We have also had a few cases of German measles, and whooping cough has prevailed.

DEDHAM.

Members of the board: P. P. Gilmore, Secretary; W. W. Burrill, Chairman; G. W. Gehan.

One nuisance was abated by the board. We have had no cases of infectious diseases. With the exception of influenza, the past year has been unusually healthy.

DEERING.

Members of the board: Andrew Hawes, Secretary; Dr. A. P. Topliff, Chairman; L. B. Chapman.

The beginning of a system of sewerage has been made, and 2,500 feet of pipe have been laid. Complaints were made of nineteen nuisances, of which all but three were removed.

Diphtheria, two outbreaks, two cases, two houses infected; scarlet fever, two outbreaks, two cases, two houses infected; typhoid fever, three outbreaks, eight cases with one death, five houses infected. In connection with cases of the infectious diseases the infected houses have been placarded and families have been kept isolated as far as possible.

DEER ISLE.

Members of the board: A. J. Beck, Secretary; W. B. Thurlow, Chairman; Seth Hatch; Dr. F. B. Ferguson, Health Officer.

Two nuisances were removed by the board. Scarlet fever, four cases, three houses; typhoid fever, eleven cases, three deaths, seven houses. As methods of improving the sanitary condition of the town, better drainage and a water supply are needed at Green's Landing. Three deaths resulted from drowning, and one from powder explosion.

DENMARK.

Members of the board: I. H. Berry, Secretary; Dr. S. T. Brown, Chairman and Health Officer; Joseph Colby.

The local board has known of no cases of infectious diseases. It has been very healthy here in the past year, most of the deaths resulting from old age and infirmity.

DENNYSVILLE.

Members of the board: H. H. Kilby, Secretary; Benj. Lincoln, Chairman; Will R. Allen.

Diphtheria, six cases, one death, two houses; typhoid fever, one case. Houses where cases of infectious diseases have occurred have been visited and notices have been posted.

Detroit.

Members of the board: David F. Libby, Secretary; Parker Sawyer, Chairman; Isaac Spaulding.

One nuisance was abated by the board. No cases of the infectious diseases were reported.

Dexter.

Members of the board: E. A. Russ, Secretary; C. H. Hayden, Chairman; Dr. C. M. Foss, Health Officer.

One nuisance was abated. Scarlet fever, four cases; three houses; typhoid fever, three outbreaks, three cases, one death. In all cases of infectious diseases a personal investigation is made and isolation is provided for. Pneumonia and the diarrhœal diseases of children were prevalent. Sewerage is needed for our principal street. Two of the cases of typhoid fever appeared to result from polluted water.

Dixfield.

Members of the board: Dr. W. H Harris, Secretary and Health Officer; Dr. G. G. Richardson, Chairman; W. H. Winslow.

We have had no cases of diphtheria, scarlet fever, or typhoid fever, but there have been some cases of German measles and pneumonia, and whooping cough has been quite prevalent. The drainage of house cellars and stable cellars and of a muck bog on the outskirts of the village would be a sanitary improvement.

Dixmont.

Members of the board: W. H. Toothak r, Secretary; Dr. H. F. Benson, Chairman and Health Officer; L. F. Simpson.

One nuisance was removed. We have had no cases of infectious diseases. Objection was made by the board to the location of a slaughter house in the immediate vicinity of a school. Dixmont is regarded as a very healthy locality, being elevated, with a rocky soil and an abundance of pure water.

Dresden.

Members of the board: Dr. L. H Dorr, Secretary and Health Officer; M. F. Leeman, Chairman; C. J. Cheney.

We have had one case of typhoid fever, but otherwise than this and whooping cough no infectious diseases have been reported. Pneumonia and the diarrhœal diseases of children were prevalent.

Durham.

Members of the board: Dr. J. L. Wright, Secretary; John E. Hasty, Chairman; C. A. Goddard.

One nuisance only was reported to the board and this mysteriously disappeared when it became known that the board would take action against it. Whooping cough was quite prevalent, as well as the diarrhœal diseases of children in their season, but we have had no cases of diphtheria, scarlet fever or typhoid fever.

Eastbrook.

Members of the board: A. P. Bunker, Secretary; A. W. Googins, Chairman; L. W. Bunker.

We have had no cases of infectious diseases, and I am pleased to make so favorable a report.

East Livermore.

Members of the board: C. H. Gibbs, Secretary; A. D. Cole, Chairman.

East Machias.

Members of the board: Dr. J. E. Tuell, Secretary; A. J. Hanscom, Chairman; F. H. Wiswell.

One nuisance was removed. Whooping cough has been prevalent, and one school was closed on account of it. We have had no cases of diphtheria, scarlet fever or typhoid fever. Several horses were attacked with a disease similar to influenza.

Easton.

Members of the board: Dr. D. G. Luce, Secretary; D. Stanchfield, Chairman; Wm. H. Rackliffe.

No case of infectious disease has occurred.

Eastport.

Members of the board: A. W. Clark, Secretary; Robinson Flagg, Chairman; A. M. Bibber.

Five nuisances reported to the board were removed. The local board of health was not appointed until an epidemic of diphtheria was well under way and the infection was widely distributed. It has resulted in ninety-three cases, nineteen deaths, and sixty houses infected. Typhoid fever, seven cases, five houses. We need sewerage for the sanitary improvement of the town.

EDDINGTON.

Members of the board: D. S. Stevens, Secretary; W. W. Eddy, J. J. Temple.

We have had no cases of infectious diseases, except one of diphtheria. One death occurred from drowning.

EDEN.

Members of the board: C. R Clark, Secretary; O. B. Knowles, Chairman; J. S. Bracy.

Three nuisances reported to the board were abated. Diphtheria, twelve cases, three deaths, seven houses; scarlet fever, one case; typhoid fever, three cases, three houses.

EDGECOMB.

Members of the board: Eben Chase, Jr., Secretary; Jos. A. Merry, Chairman; D. B. Clifford.

One nuisance was removed by the board. Pneumonia and typhoid pneumonia were quite prevalent through the year, but we had no case of infectious disease, except one of typhoid fever. One bad accident resulted from a fall.

EDINBURG.

Members of the board: C. W. Eldredge, Secretary; C. G. Casey, Chairman; G. H. Eldredge.

We have had no cases of infectious diseases.

EDMUNDS.

Members of the board: Dr. J. P. Sheahan, Secretary and Health Officer; C. W. Hobart, Chairman; I. H. Allen.

Diphtheria, one outbreak, two cases, one house; typhoid fever, one outbreak, three cases, two houses.

Eliot.

Members of the board; Albert Lord, Secretary; Dr. J. L. M. Willis, Chairman; Dr. H. I. Durgin.

Diphtheria, two outbreaks, three cases, two houses; typhoid fever one case, ending in recovery. The diarrhœal diseases of children were prevalent in the summer. One man was killed by falling and becoming impaled on an iron bar.

Embden.

Members of the board: J. W. Morin, Secretary; R. F. Durrell, Chairman; S. A. Walker.

Chicken-pox appeared in one school, but otherwise than that there have been no cases of infectious diseases.

Enfield.

Members of the board: A J. Darling, Secretary; J. R. M. Gilman, Chairman; T. S. Laing.

A few improvements have been made. Water has been brought to the pulp mill boarding house, and in a few cases drains have been made to carry off the surface water. One nuisance was reported and three were removed. We have had typhoid fever in three houses; four cases in all. One case of pneumonia occurred. At Montague there are some unhealthy conditions owing to the rapidity with which the place has been built up. Some families here have been using water from holes dug in the low lands, not fit for a dog to drink. They are, however, changing rapidly to the use of better water supplies and some have put in drains and others will as soon as they can get at it.

Etna.

Members of the board: S. J. Locke, Secretary; E. E. Sylvester; J. Goodell.

We have had one case of typhoid fever.

Eustis.

Members of the board: O. A. Hutchins, Secretary; C. D. Stevens, Chairman; F. L. Porter.

We have no cases of diphtheria, typhoid or scarlet fever, but German measles, mumps and pneumonia have been quite prevalent,

with no serious results, except from the last disease. Two deaths have resulted from pneumonia. Two deaths occurred from accidents while handling logs.

EXETER.

Members of the board: Dr. W. F. Hart, Secretary; E. A. Chandler, Chairman; Dr. S. W. L. Chase.

One nuisance was removed, and one case of typhoid fever occurred. Two deaths occurred from accident, one by drowning, and one by the discharge of a gun.

FAIRFIELD.

Members of the board: Geo. C. Eaton, Secretary; Dr. F. J. Robinson, Chairman; F. J. Savage.

Some slight improvements have been made in the sanitary condition of the town, but nothing in comparison with what should be made. Better sewerage is needed very much. Twelve nuisances were reported to the board. All have been removed as far as possible. We have had two cases of diphtheria in a mild form and one of typhoid fever.

FALMOUTH.

Members of the board: H. J. Merrill, Secretary; W. K. Swett, Chairman; W. E. Winslow; Dr. E. A. Fessenden, Health Officer.

One nuisance was abated. Diphtheria, three cases, two deaths, one house; typhoid fever, one case. One of the schools was closed on account of the outbreak of diphtheria. Two deaths have occurred from drowning. Tuberculosis appeared in one herd of cattle.

FARMINGDALE.

Members of the board: Dr. F. M. Putnam, Secretary and Health Officer; A. C. Stilphen, Chairman; Arthur McCausland.

The city water supply has been put into some houses where the water supply has been poor. One nuisance has been abated. We have had one case of typhoid fever. Whooping cough and catarrhal diseases have been prevalent.

FARMINGTON.

Members of the board: Dr. F. O. Lyford, Secretary; E. O. Greenlief, Chairman; H. W. Lowell.

Eight nuisances have been reported to the board and all but two have been removed. We have had one case of scarlet fever, one of diphtheria, and one of typhoid fever. Whooping cough has been prevalent. A good system of sewerage is needed in the village.

Fayette.

Members of the board: H. T. Wing, Secretary; A. A. Campbell, Chairman; J. F. Stevens.

We have had four cases of scarlet fever in one house. In connection with these cases we required the patients to be put into a room by themselves and that all clothing used about them be put into water before it was carried from the room, and then thoroughly boiled. The house was placarded. There have been a few cases of whooping cough. A scholar in district number three, having had scarlet fever in a light form, began to go to school again in about ten days from the time she came down with the disease. The school was closed for a fortnight and the rooms were disinfected. One case of tuberculosis occurred in a Jersey cow. The case was taken in hand by the State Cattle Commissioners and the animal was killed.

Forest City.

Members of the board: Samuel Hatch, Secretary; A A. Cox, Chairman; J. E. Haley; Dr. P. W. Cody, Health Officer.

We have had thirty cases of scarlet fever, eleven houses; typhoid fever, four cases, three houses. Pneumonia has been prevalent.

During the past year our board has had considerable work to do. In the early fall scarlet fever appeared in the village across the river on the Province side. As the majority of the inhabitants of that district did not make any energetic attempt to confine it, our board placed a guard on the bridge, and caused those who were likely to be infectious to remain on their own side of the river. This had the effect of producing a turmoil. Parties on both sides of the line being ignorant of the danger of scarlet fever, as well as of the laws governing the local board of health, worked with an energy worthy of a better cause to thwart the efforts of the board to prevent the spread of the contagion. After a time they quarantined the houses containing patients suffering from scarlet fever, and then the guard was removed, but in the meantime the disease had reached our town on the American side.

In one family a case of scarlet fever occurred in a child. During the sickness of this child, and for two months afterwards, a sister with her mother was away from home seventy miles distant. In the place where they were staying there were no cases of scarlet fever, and no communication was held from home, by letter or otherwise. The little girl and her mother returned home Saturday evening and in excellent health and spirits, but the child was stricken with the fatal malady three hours after her arrival. When first seen, soon after she was taken sick, she was in an unconscious state, thermometer placed in the axilla showed 107 degrees. The pulse could not be counted and the stomach was irritable. Medicine had no effect and she died within four days. The house had been thoroughly attended to so far as disinfection is concerned, after the recovery of the first case two months previously.

Another case which appeared peculiar to me occurred in a boy eleven years old. When I first saw him he had well marked symptoms of typhoid fever, they being as follows: anorexia, headache, epistaxis, a dark purple flush of face, delirium, fever remittant in character, evening temperature being one and a half degrees higher than that of the morning. Tympany and gurgling were present in the right iliac fossa on the fifth day. On the seventh day I found that the mucous membrane of the throat and mouth were inflamed and that the eruption of scarlatina covered the whole body. The eruption remained ten days, and the patient recovered after a severe illness of five weeks.

A troublesome nuisance has been caused by some of the farmers by spreading the fleshings from the tanneries upon the surface of fields near highways and in other places where this kind of fertilizer is offensive. If it were ploughed under, it would be excusable, but to allow this putrid flesh to remain scattered over the surface is an outrage to the community.

Fort Fairfield.

Members of the board: A. C. Cary, Secretary; E. E. Scates, Chairman; G. E. Bartlett; Dr. A. D. Sawyer, Health Officer.

A number of cases of scarlet fever occurred during the winter of 1889-90. Three nuisances were removed.

Foxcroft.

Members of the board: R. M. Ingalls, Secretary; O. P. Martin, Chairman; N. F. Batchelder; Dr. Wm. Buck, Health Officer.

Three nuisances have been removed. One case of diphtheria.

FRANKFORT.

Members of the board: F. L. Tyler, Secretary; J. T. Rowe; F. L. Trundy; Dr. E. W. Temple, Health Officer.

Four nuisances have been removed. We have had one fatal case of diphtheria. Measles and mumps have been prevalent.

FRANKLIN.

Members of the board: G. H. Rutter, Secretary; O. C. Donnell, Chairman; Henry Whittaker.

We have had eight cases of diphtheria with two deaths; three houses were infected.

FRANKLIN PLANTATION.

Members of the board: L. C. Putnam, Secretary.

We have had one case of diphtheria and six of scarlet fever. One nuisance was removed.

FREEMAN.

Members of the board: A. W. Mayo, Secretary; N. H. Peterson, Chairman; J. M. Burbank.

One nuisance was removed. We have had no cases of diphtheria, scarlet fever or typhoid fever.

FREEPORT.

Members of the board: W. C. Fogg, Secretary; J. P. Merrill, Chairman; B. P. Soule; Dr. H. F. Twitchell, Health Officer.

Six nuisances were reported to the board, all but one of which were removed. We have had two cases of typhoid fever. The diarrhœal diseases of children were prevalent in the summer. The cellar under the high school building is very wet and it should be looked after in the spring.

FRIENDSHIP.

Members of the board: Dr. G. C. Chamberlain, Secretary and Health Officer; R. R. Morton; F. G. Jameson.

We have had one case of typhoid fever. Pneumonia and the diarrhœal diseases of children were prevalent.

FRYEBURG.

Members of the board: Eckley Ballard, Secretary; Dr. Irving Mabry, Chairman, E. S. Chase.

We have had three cases of typhoid fever with one death. There has been no prevailing disease among the children the past year.

Garland.

Members of the board: Dr. F. A. C. Emerson, Secretary and Health Officer; E. L. Oak, Chairman; D. A. Robinson.

There has been no town action as regards sanitary improvement, but there has been a noticeable improvement in privies and in the disposal of excreta among the people. We have had three cases of typhoid fever, with one death.

Georgetown.

Members of the board: J. L. Berry, Secretary; S. P. Oliver, Chairman; John Hunt.

Gilead.

Members of the board: P. Harriman, Secretary; Edgar Harriman, Chairman; Seth Bemis.

We have had no cases of infectious disease.

Glenburn.

Members of the board: J. F. Tolman, Secretary; Elisha Hill, Chairman; H. N. Parker.

The last year has been one of exceptional good health for the town. We have had no case of infectious diseases.

Glenwood Plantation.

Members of the board: Alonzo Springer, Secretary; Aaron Austin; I. P. Pierce.

Gorham.

Members of the board: G. W. Heath, Secretary; C. G. Carver, Chairman; A. W. Lincoln, Health Officer.

Six nuisances were reported to the board, all of which were removed. We have had six cases of scarlet fever, and four cases of typhoid fever. There is need of better drainage and sewerage in the village. Two accidents resulted from becoming caught in a belt.

Gouldsboro.

Members of the board: T. R. Hammond, Secretary; R. R. Joy, Chairman; Dr. C. C. Larrabee.

No cases of contagious diseases were reported. One case of drowning occurred from the capsizing of a boat.

Gray.

Members of the board: Dr. J. F. Rowell, Secretary; Dr. E. T. Andrews, Chairman; Dr. E. A. McCollister.

Three nuisances reported to the board were all removed. Diphtheria, five cases, three houses; scarlet fever, two cases, two houses; typhoid fever, three cases, three houses. Houses have been placarded and disinfectants have been used. On recovery, the buildings have been fumigated. Measles have been prevalent. One child three years old was drowned.

Greenbush.

Members of the board: H. F. Harris, Secretary; M. J. Harris, Chairman; W. W. Harris.

We have had one case of typhoid fever.

Greene.

Members of the board: Dr. F. E. Sleeper, Chairman; Dr. Albion Pierce, Health Officer; Alden Sawyer.

No cases of infectious diseases were reported to this board.

Greenfield.

Members of the board: E. C. Edgerly, Secretary and Health Officer; M. C. White, Chairman; Jere Avery.

Greenville.

Members of the board: H. A. Sanders, Secretary; L. A. Young, Chairman; Dr. H. Hunt, Jr., Health Officer.

A water supply has been brought from a hill and has been quite generally introduced. Three nuisances reported to the board were removed. We have had seven cases of scarlet fever; five houses were infected. Whooping cough has prevailed. An improvement in our sewerage is needed.

Greenwood.

Members of the board: A. C. Libby, Secretary; W. B. Rand, Chairman; Wm. Richardson.

We have had one case of diphtheria and three cases of scarlet fever in one house. Scarlet fever entered one school. The house was closed until it was thoroughly cleansed.

Guilford.

Members of the board: Henry Straw, Secretary; L. N. Whittier, Chairman; John Scales.

Two nuisances reported to the board were removed. We have had twenty-five cases of scarlet fever with two deaths. The outbreak was traced to infected clothing.

Hallowell.

Members of the board: Dr. J. M. Eveleth, Secretary; E. W. Maddox, Chairman; I. M. True.

A few complaints in writing, and many verbal ones, have been made, and all of the nuisances have been removed. We have had two cases of diphtheria with one death, and two cases of typhoid fever. We have reason to believe that some cases are not reported. More sewers are needed and a more plentiful water supply. One death occurred from drowning, and one of our residents was killed out of town by the cars.

Hampden.

Members of the board: Dr. W. H. Nason, Secretary and Health Officer; H. W. Mayo, Chairman; C. F. Cowan.

Two nuisances were reported. We have had two cases of diphtheria in one house.

Hancock.

Members of the board: A. B. Crabtree, Secretary; R. H. Young.

No cases of infectious diseases have been reported to the board.

Hanover.

Members of the board: J. B. Roberts, Secretary; J. R. Howard, Chairman; C. E Chapman.

I am happy to say that we have had no nuisances and no cases of infectious diseases as far as I know.

HARMONY.

Members of the board: L. S. Reed, Secretary; S. Leighton, Chairman; F. K. Hurd.

Four nuisances have been removed. No cases of contagious diseases have appeared, except whooping cough.

In a family of five persons, all were taken sick with bowel complaint and one died. The doctors were puzzled as to the cause. The board of health was notified and made an examination, but discovered nothing to account for the disease. The family continued to become worse. In a few days we were called again, for the doctor said there must be some cause undiscovered. At this second visit, in traveling around the house, it was suspected that slops might have been thrown out of the windows, and, as the ground sloped toward the house, that the soakage might have run into the cellar. We therefore had a man haul away several loads of earth from the back side of the house and replace it with fresh earth. In doing this he found, a little below the surface, several inches of human excreta nearly the whole length of the house, and especially near the sleeping room windows. After it was all removed and the cellar ventilated the remaining four members of the family recovered after a lingering sickness. We have no question that the trouble was caused by this condition of things, and the doctor thinks so too.

HARPSWELL.

Members of the board: J. S. Farr, Secretary; G H. Dearbon, Chairman; J. N. Stinson.

Three nuisances were reported, two of which were removed. Diphtheria fourteen cases, three deaths, eleven houses; typhoid fever, one case. One death occurred from drowning.

HARRINGTON.

Members of the board: E R. McKenzie, Secretary; Dr. G. H. Walling, Chairman; C. W. Wass

Diphtheria, one case; typhoid fever, two cases, two houses. Whooping cough has been prevalent A small coaster on which two men from this town were sailing, while in Boston took water which smelled and tasted bad, and soon after arriving home, four of the five making the crew were taken sick. One of the men belonging to our town had typhoid fever and the other one was

threatened with the disease. The other men of the crew belonged to some other town.

HARRISON.

Members of the board: A. Moulton, Secretary; S. L. Weston, Chairman; Dr. H. H. Cole.

We have had one case of typhoid fever. A few places are needlessly unhealthy on account of bad drainage and bad water resulting from the nearness of privies and sink spouts to the well.

HARTLAND.

Members of the board: A. W. Miller, Secretary; Dr. J. F. Brown, Chairman and Health Officer; A. N. Buck.

We have had two cases of typhoid fever.

HAYNESVILLE

Members of the board: S C. Cummings, Secretary; A. G. Chambers; J. H. Bryson.

HEBRON.

Members of the board: Dr J. C. Donham, Secretary and Health Officer; Cyrus Ramsdell; D. F. Cummings.

Four nuisances have been reported, three of which have been removed. A school-house privy was condemned as a nuisance in October, but the agent has not yet removed it. We have had one case of typhoid fever in each of two houses. Pneumonia has been quite prevalent.

[The following is the printed report of the local board —A. G. Y.]

"We have held the regular meetings of the board directed by law. We have given personal attention and inspection to every instance to which our attention has been called, either in the form of complaint or report. We have abated three nuisances of decaying carcasses of animals. We have made personal inspection of our school-houses and their privy conveniences, and do recommend that every district give immediate attention to providing for their children such conveniences at their school-houses as to conform to their moral instruction at home.

"We report with pleasure the marked care shown by most of our citizens in providing proper sink spout drainage from their dwellings, also the care given to the cleanliness of the out-buildings

during the hot months. Most of our citizens have learned to guard well the source of their drinking water.

"We desire to thank the people of Hebron for the sensible manner in which they have supported the health board in the discharge of its delicate and unpleasant duties."

HERMON.

Members of the board: Dr. F. P. Whitaker, Secretary; F. A. Bishop, Chairman; J. Tuesley.

One nuisance was removed. Scarlet fever, seven cases, two houses; typhoid fever, two cases, two houses.

HERSEY.

Members of the board: E. E. Morse, Secretary; L. M. Davis, Chairman; J. P. Crommett; Dr. B. C. Woodbury, Health Officer.

HIRAM.

Members of the board: John Pierce, Secretary; A. K. P. Googins, Chairman; S. D. Wadsworth; Dr. C. E. Wilson, Health Officer.

One nuisance was removed. I am happy to say that we have had no cases of diphtheria, scarlet fever or typhoid fever. Whenever these cases do occur we have taken all precautions.

HODGDON.

Members of the board: Moses Benn, Secretary; Dr. J. V. Tabor, Chairman; Wm. A. Atherton.

Diphtheria, two cases, two houses; typhoid fever, three cases. Houses where cases of the infectious diseases have occurred have been visited and all necessary instructions have been given.

HOLDEN.

Members of the board: P. L. Pond, Secretary; Alex. Tirrell, Chairman; J. E. Rowe.

We have had one case of diphtheria and two of typhoid fever. The board has seen that all necessary means has been used to prevent the spread of the disease.

Hollis.

Members of the board: T. J. Carle, Secretary; C. E. Randall, Chairman; Collins Haley.

Several nuisances have been removed at the request of the board. We have had no cases of infectious diseases, except mumps. Pneumonia has been prevalent

The clear, steady cold weather of December has had a tendency to improve the health of the inhabitants and general good health has prevailed.

Hope.

Members of the board: D. H. Mansfield, Secretary; M. Metcalf, Chairman; Levere Howard; Dr. Isaac Bartlett, Health Officer.

We have had two cases of scarlet fever. The outbreak was at South Hope. It would improve the sanitary condition of the town if some of the sources of the drinking water were changed.

Houlton.

Members of the board; Dr. C. E. Williams, Secretary; L. B. Johnson, Chairman; Dr. Geo. Cary.

The sewerage system has been extended. About fifty nuisances were reported. Nearly all were removed so far as was practicable.

Diphtheria, one case; scarlet fever, seven cases, five houses; typhoid fever, one case. The methods pursued in connection with these cases have been personal visitation in nearly all the cases, distribution of circulars, and the giving of information and instruction as to the prevention of contagion. Two fatal cases of cerebro-spinal meningitis occurred. There had been no cases of this disease here previously for several years.

Howland.

Members of the board: J. O. Davis, Secretary; O. C. Sweat, Chairman; L. T. Mason.

We have had one case of typhoid fever, but have known of no other cases of infectious diseases. Pneumonia was prevalent.

Hudson.

Members of the board: W. B. Hastings, Secretary; L. H. Strout, Chairman; P. Barker.

We have had no cases of diphtheria, scarlet fever, or typhoid fever.

Hurricane Isle.

Members of the board: M. H. McIntyre, Secretary; J. J. McCabe, Chairman; Eugene Thomb.

No cases of the infectious diseases were reported. Two deaths occurred from drowning.

Industry.

Members of the board: Wm. C. Hatch, Secretary; H. B. Luce, Chairman; C. W. Gilmore

We have had one fatal case of typhoid fever. The family was furnished with disinfectants and was given such sanitary instructions as were deemed necessary. Whooping cough and chicken pox have been unsually prevalent.

Island Falls.

Members of the board: G. H. Donham, Secretary; A. Craig, Chairman; W. D. Warren

We have had no cases of infectious diseases. It has been remarkably healthy.

Isle au Haut.

Members of the board: J. H. Simpson, Secretary; James Robinson, Chairman; J. T. Barter.

Our town has good drainage and good water. We have had no cases of diphtheria, typhoid or scarlet fever Seven cases of measles occurred in one family. At first there was a suspicion of varioloid, but the disease proved to be measles. Precautions being taken in season, it did not spread outside of the family.

Islesboro.

Members of the board: J. A. Sprague, Secretary; Alonzo Coombs, Chairman; L. W. Hammons.

Two nuisances were removed. We have had nine cases of diphtheria. Five houses were infected.

Jackson.

Members of the board: D. D. Gould, Secretary; J. H. Cook, Chairman; J. B. Jacobs, Health Officer.

We have had no cases of infectious disease.

Jay.

Members of the board: H. H. Allen, Secretary; S. B. Farnum, Chairman; E. W. Gould.

One nuisance was removed. Two cases of typhoid fever, two houses. Whooping cough and pneumonia have prevailed. Better drainage is needed.

Jefferson.

Members of the board: J. J. Bond, Secretary; H. W. Clary, Chairman; Dr. A. A. Jackson.

We have had one case of diphtheria.

Jonesboro.'

Members of the board: E. M. Watts, Secretary; G. F. Whitney, Chairman; G. E. Noyes, Dr. H. H. Smith, Health Officer.

About ten complaints of nuisances were received. All of them were willingly removed by their owners as soon as they were spoken to. Typhoid fever four cases, two houses. In the months of August, September and October, the diarrhœal diseases were quite prevalent, and there was a considerable number of pneumonia cases, apparently the result of *la grippe*.

Jonesport.

Members of the board: J. W. Kelley, Secretary; G. E. Watts, Chairman; E. L. Kelley.

Diphtheria, five cases, three houses; typhoid fever, one case. The houses were placarded in the cases of diphtheria and every precaution was taken to keep the disease from spreading. Three deaths occurred from consumption, one in a child six years of age, one a young lady or sixteen, and one a young married lady. A foreigner, aged sixty-five years, a resident of this town for fifteen years, took Paris green which resulted in death. A very sad case of drowning occurred. Two young men sixteen and eighteen years of age filled their boat, loaded with lobster traps, and were both drowned in sight of their father's house.

Kenduskeag.

Members of the board: G. W. Worster, Secretary; M. L. Fisher, Chairman; A. A. Cook.

KENNEBUNK.

Members of the board: Dr. F. M. Ross, Secretary and Health Officer; John Cousens, Chairman; E. G. Littlefield.

Diphtheria two cases, two houses; typhoid fever one case. There have been several cases of pneumonia and measles, and an unusual number of cases of rheumatic fever. A child was drowned by falling into the river.

KENNEBUNKPORT.

Members of the board: W. H. Cluff, Secretary: E. T. Colman, Chairman; Ivory Bickford.

One sewer was built for the accommodation of summer cottages. Four nuisances were removed. Diphtheria, one case; scarlet fever, two fatal cases, two houses; typhoid fever, one fatal case. Measles and the diarrhœal diseases of children have been prevalent One case of contagion occurred where preceding cases were not reported to this board. One case of accidental drowning.

KINGFIELD.

Members of the board: W. E. Cummings, Secretary; C. W Clark, Chairman; James Lord.

We have had no cases of diphtheria, typhoid or scarlet fever.

KINGSBURY.

Members of the board: W. S. Hilton, Secretary; H. R. Sinclair, Chairman; J. H. Smith; Samuel Whitman, Health Officer.

We have had no cases of diphtheria, scarlet fever, or typhoid fever.

KITTERY.

Members of the board: Dr. L. O. Buzzell, Secretary; Dr. M. F. Wentworth, Chairman; Dr. A. W. Johnson.

Four nuisances have been removed. We have had five cases of diphtheria in one house There are some unhealthy conditions in the upper village. We need a water supply and a system of sewerage.

KNOX.

Members of the board: J. R. Sparrow, Secretary; J. H. Brown, Chairman; J. H. Linekin.

No cases of infectious diseases are reported.

Lagrange.

Members of the board: H. W. Blake, Secretary; Fred H. Savage, Chairman; Dr. A. H Stanhope, Health Officer.

We have had no cases of infectious diseases the past year.

Lamoine.

Members of the board: W. S. Hodgkins, Secretary; E. H. King, Chairman; I. N. Salisbury.

One nuisance was removed. Two cases of scarlet fever in the same house Whooping cough was somewhat prevalent.

Lebanon.

Members of the board: S. D Lord, Secretary; Dr. J. S. Parker, Chairman and Health Officer; Horace Williams.

Lee.

Members of the board: O. I. Getchell, Secretary; J. G. Ricker, Chairman; A. K. Lewis.

No cases of diphtheria, scarlet fever, or typhoid fever, but whooping cough prevailed to a slight extent.

Leeds.

Members of the board: H. M. Brewster, Secretary; Albert Barker, Chairman; Dr. R. S. Loring.

Diphtheria, eleven cases, six deaths, four houses infected. June 17th, Ethel Drake, aged seven years, was taken sick with diphtheria, and died on the 24th. On the day of her death, her mother, and the next day, her father, were taken down with the disease, but they both recovered after a sickness of two weeks. Eleven days before Ethel was taken sick she visited the house where a young woman had died of consumption, and where, in the preceding January, five had died of diphtheria. While at this house a trunk was opened for clothing, which had not been opened since it was brought from Lawrence, Mass., whence it will be remembered the infection was brought in furniture and clothing that started the epidemic resulting in five deaths in this house in January, 1890.

LEWISTON.

Members of the board: C. V. Emerson, Secretary; Dr. O. A. Horr, Chairman; Dr. J. A. Donovan.

Thirty-eight nuisances were reported, thirty-one of which were removed. Diphtheria, ten cases, in seven houses; scarlet fever, eight cases, five houses; typhoid fever, twelve cases. An extension of the sewerage system is needed.

LIBERTY.

Members of the board: Dr. E. A. Porter, Secretary; Wm. H. Moody, Chairman; J. O. Johnson.

We have had four cases of typhoid fever with one death. Whooping cough has been prevalent. This outbreak of typhoid fever was imported, and was prolonged by impure water in a well in the stable.

LIMERICK.

Members of the board: Dr. J. D. Haley, Secretary; Chas. Libby, Chairman; J. Holland, Jr.

LIMESTONE.

Members of the board: A. D. Hatfield, Secretary; E. G. Weymouth, Chairman; Mark Trafton.

One nuisance was removed. Typhoid fever, seven cases, one death, five houses.

LIMINGTON.

Members of the board: W. S. Small, Secretary; Dr. J. F. Moulton, Chairman; Dr. G. W. Weeks.

We have had one case of scarlet fever, six of typhoid fever, five of mumps, and fifteen of pneumonia, with six deaths.

LINCOLN.

Members of the board: Dr. C. Fuller, Secretary and Health Officer; C. A. Sargent, Chairman; L. W. White.

Two nuisances were removed. We have had three cases of typhoid fever with one death. Pneumonia has been prevalent. There is need of a sewer through Main street. One case of voluntary poisoning with Paris green.

LINCOLNVILLE.

Members of the board: Dr. E. F. Benson, Secretary and Health Officer; Benson Sherman.

Our water supply is good throughout the town, and drainage, sewerage and excreta are carefully looked after. Four nuisances were removed.

Diphtheria, three cases, two houses; scarlet fever, two cases, one house; measles and pneumonia have been prevalent.

LINNEUS.

Members of the board: Dr. Robert Boyd, Secretary and Health Officer; R. B. Young, Chairman; G. W. Getchell.

We have had no cases of diphtheria, typhoid, or scarlet fever. In no summer and autumn since I have been in practice, have I seen so few cases of bowel troubles as in the last season. One fatal accident resulted from the falling of a pitch fork grapple.

LISBON.

Members of the board: C. H. Miles, Secretary; Henry Hackett, Chairman; W. S. Merrill; Dr. A. W. Potter, Health Officer.

Twenty-five nuisances were removed. Diphtheria, five cases, two deaths, two houses infected; scarlet fever, one case; typhoid fever, six cases, three deaths, six houses. Whooping cough and pneumonia have been prevalent, and we have had a few cases of German measles.

A good sewerage system is needed in Lisbon Falls. Two deaths resulted from drowning On account of an outbreak of rabies, twenty-five dogs were killed by order of the board, and more than as many more by their owners. All the other dogs were confined or securely muzzled.

LITCHFIELD.

Members of the board: G. Roberts, Jr., Secretary; Dr. Enoch Adams, Chairman; Thos. Holmes.

Two nuisances reported to the board were removed. We have had no cases of diphtheria, scarlet fever, or typhoid fever. One family had a disease resembling diphtheria and it resisted treatment until the water which they used for drinking purposes was boiled, when all speedily recovered. The spring is so situated that

it catches the drainage from the sink spout and privy. The school children who have been accustomed to use water from this spring have been troubled much with sore throats. This has been noticed for several years.

LITTLETON.

Members of the board: L. F. Hall, Secretary; G. C. Hayward, Chairman; H. A Hall.

Two nuisances were removed. We have had no cases of infectious diseases, except German measles. Pneumonia has been prevalent.

LIVERMORE.

Members of the board: W. F. Fuller, Secretary; R. B. Bradford, Chairman; Dr. G. F. Adams, Health Officer.

LOVELL.

Members of the board: Dr. C. P. Hubbard, Secretary; W. W. Durgin, Chairman; J. K. P. Vance.

We have had no cases of diphtheria, typhoid, or scarlet fever. We had rather more cases of pneumonia than usual, which I think were complications of, or caused by, influenza.

LOWELL.

Members of the board: J. F. Dam, Jr., Secretary; J. Varney, Chairman; M. O'Halloran.

No cases of contagious diseases are reported.

LYMAN.

Members of the board: A. J. Blanchard, Secretary; Dr. E. Hurd, Chairman; A. F. Roberts.

Diphtheria, one case; scarlet fever, eight cases, two houses. Whooping cough prevailed to quite an extent. Scarlet fever entered one of the schools. The school was closed at once and the school-room was disinfected.

MACHIAS.

Members of the board: Dr. H. H. Smith, Secretary and Health Officer; C. B. Donworth, Chairman; Dr. S. B. Hunter.

Two nuisances were removed. Diphtheria, two cases, one house; typhoid fever, three cases, three houses. Whooping cough and the diarrhœal diseases were quite prevalent. One man, a few miles from here, was killed last summer in the haying field by lightning. Two cases of poisoning occurred from eating canned corn beef.

MACHIASPORT.

Members of the board: C. W. Gates, Secretary; Edward Small, Jr., Chairman; Robert Stuart.

We have had thirty-one cases of diphtheria, with six deaths; eleven houses were infected. One death occurred from drowning.

MADAWASKA.

Members of the board: Arthur Daigle, Secretary; Michael Martin, Chairman; Lament Fouriner.

We have had no cases of diphtheria, typhoid, or scarlet fever. Measles has been quite prevalent.

MADISON.

Members of the board; C. W. Dyer, Secretary; C. D. Morrill, Chairman; John Chadbourne.

MADRID.

Members of the board: L. P. Rowe, Secretary; Reuben Sargent, Chairman; David Wilbur.

One nuisance was reported. We have had no cases of contagious disease.

MANCHESTER.

Members of the board: G. M. Knowles, Secretary; W. R. Merrill, Chairman; F. J. Hewins.

Not a case of contagious disease has come to the knowledge of the board of health the past year. A boy was drowned by accidently falling from a bridge

MAPLETON.

Members of the board: J. C. Chandler, Secretary; J. A. Stewart, Chairman; James McAlpine.

Two nuisances were removed. Contagious diseases prevailed in adjoining towns, but prompt action was taken to prevent them from extending into this town.

Mariaville.

Members of the board: Benj. Young, Secretary; G. W. Black, Chairman.

We have had two cases of typhoid fever. Three deaths have occurred in the town, all from old age.

Marion.

Members of the board: B. L Smith, Secretary; Jos Thompson, Chairman; F. N. Gardner.

Marshfield.

Members of the board: J. W. Foss, Secretary; Wm. Hilton, Chairman; Thomas Berry.

No cases of contagious diseases are reported.

Mars Hill.

Members of the board: F. L. Keay, Secretary; H. W. Safford, Chairman; Dr. J. H. Syphers, Member and Health Officer.

Two nuisances reported to the board were removed. We have had no cases of diphtheria, typhoid, or scarlet fever. Two cases of glanders in horses.

Masardis.

Members of the board: F. W. E. Goss, Secretary; H. D. Smith, Chairman; S. W. Clark

We have had no cases of diphtheria, typhoid or scarlet fever.

Mason.

Members of the board: F. I. Bean, Secretary; H. G. Mason, Chairman; Arthur Morrill.

We have had no cases of contagious diseases.

Mattamiscontis.

Members of the board: W. G. Sawyer, Secretary; E. E. Roberts, Chairman; W. P. Roberts.

Mattawamkeag.

Members of the board: F. J. Fiske, Secretary; Alex. McClain, Chairman; G. F. Stratton.

One nuisance was removed. We have had no cases of contagious diseases.

Meddybemps.

Members of the board: J. S. Bridges, Secretary; A. J. Allen, Chairman; C. L. Hatton.

We have had no cases of contagious diseases. Only two deaths occurred last year; one was an infant only a few days old, the other an old man.

Medford.

Members of the board: S. O. Dinsmore, Secretary; W. S. Lovejoy, Chairman; D. A. Hathorn.

We have had no cases of contagious diseases.

Medway.

Members of the board: S. Pomroy, Secretary; N. A. Powers, Chairman; C. F. Moore.

Two nuisances were removed. Last spring the board made a sanitary examination of the whole town. We have had no cases of infectious diseases.

Mercer.

Members of the board: Dr. V. R Perkins, Secretary and Health Officer; I. S. Ford, Chairman; A. M. Pattee.

One nuisance was removed. We had one case of scarlet fever. Prompt action was taken to secure isolation and disinfection. The diarrhœal diseases of children were quite prevalent.

Mexico.

Members of the board: H. W. Parke, Secretary; H. G. Virgin; L. H. Harlow.

We have had no cases of contagious diseases, except a few of whooping cough.

Milbridge.

Members of the board: Dr. Geo. Googins, Secretary and Health Officer; L. G. Means, Chairman; Dr. G. A. Sawyer.

Improvements have been made in drains, sewerage, etc. Two nuisances reported to the board were removed. Diphtheria, three cases, two houses; typhoid fever, one case. Whooping cough and

the diarrhœal diseases of children were prevalent. Better drainage of houses and premises and more care in the selection of water supplies is needed.

MILFORD.

Members of the board: M. W. Sawyer, Secretary; M. A. Austin, Chairman; A. Hammond.

We have had no cases of diphtheria, typhoid or scarlet fever. In one locality the land is low and needs proper drainage.

MILO.

Members of the board: A. W. Murray, Secretary, M. [illegible] Durgin, Jr., Chairman; Dr. H. Hamlin.

MINOT.

Members of the board: Dr. C. M. Cobb, Secretary; Dr. C. A. Tobie, Chairman; C. F. True.

Three nuisances were removed. We have had two cases of typhoid fever. Whooping cough has prevailed. Sewers and water supply are needed.

MONMOUTH.

Members of the board: J. H. Norris, Secretary; Dr. D. E. Marston, Chairman and Health Officer; H. O. Pierce.

We have had one case of diphtheria. House was placarded, inmates isolated, etc. Catarrhal and bronchial troubles were quite prevalent.

Two children were taken sick after eating colored candy. The symptoms were suspicious and the health officer thought it probable that poison was present. Both children recovered in a short time.

MONROE.

Members of the board: Dr. J. J. Sewall, Secretary and Health Officer; Freeman Atwood, Chairman; E. H. Nealley.

The village sewer has been improved. Two nuisances were removed. Scarlet fever, one case; typhoid fever, three cases, one death, three houses. More attention to the condition of privies and to procuring pure water for household use is desirable. Frequent suggestions have been made by the board relative to better drainage, ventilation and water supply.

MONSON.

Members of the board: D. J. Jackson, Secretary; L. P. Bray, Chairman; J. Davison; Dr. A. H. Hardy, Health Officer.

Diphtheria, five cases, one death, five houses infected; scarlet fever, two cases. German measles was prevalent. Better drainage is needed, particularly for a pool from a hotel.

MONTICELLO.

Members of the board: G. W. Lowell, Secretary; M. J. Hogan, Chairman; O. A. Stanley.

We have had two cases of typhoid fever. Two houses were infected. "What methods can you suggest for improving the sanitary condition of your town?" "Drink less rum and more water."

MONTVILLE.

Members of the board: Dr. A. D. Ramsey, Secretary; B. F. Foster, Chairman; J. W. Collins.

We have had no cases of infectious diseases.

MORRILL

Members of the board: D. O. Bowen, Secretary; Dr. J. W. Pearson, Chairman; B. A. Hatch.

We have had no cases of contagious diseases, except measles, confined to one family, and a few cases of whooping cough. For the improvement of the sanitary condition of the town, I would suggest education in physiology and hygiene.

MOSCOW.

Members of the board: A. Burke, Secretary; C. M. Hill, Chairman; Thomas Emerton.

We have had nine cases of scarlet fever; four houses were infected. Much improvement might be made by many families if they would take more pains to secure a pure water supply.

MT. CHASE.

Members of the board: E. A. Cooper, Secretary; Willis Myrick, Chairman; John Sargent.

Our town has been unusually healthy since the organization of the local board. In the early part of June we inspected the dwelling

houses in the town and found them all in a healthful condition. We have had no contagious diseases. One child was burned to death by her clothing catching fire while she was playing around a stove.

Mt. Desert.

Members of the board: S. M. Nash, Secretary; B. T. Atherton, Chairman; W. S. Smallidge.

Mt Vernon.

Members of the board: H. F. Fletcher, Secretary; R. F. Fletcher, Chairman; J. A. Robinson.

We have had one case of scarlet fever and one of typhoid fever. I have visited the infected houses and have prescribed the proper sanitary measures.

Naples.

Members of the board: P. O. Cannell, Secretary; G. W. Hall, Chairman; Dr. C. Y. Lord.

No changes have been made in the water supply, the drainage, or the disposal of excreta, except better applications of former methods. Two nuisances have been removed. We have had no contagious diseases. One death occurred from drowning.

Newburgh.

Members of the board: C. H. Whitcomb, Secretary; B. D. Newburgh, Chairman; Dr. F. O. J. S. Hill.

We have had three cases of scarlet fever and one of typhoid fever. Prompt action has been taken to keep the disease from spreading.

Newcastle.

Members of the board: D. S. Glidden, Secretary; R. C. Chapman, Chairman; S. D. Wyman.

Two nuisances were removed. We have had two cases of typhoid fever; two houses were infected. Whooping cough has prevailed. One case of accidental drowning occurred and one probably not accidental.

Newfield.

Members of the board: I. M. Trafton, Secretary; T. E. Mitchell, Chairman; C. L. Wentworth.

No cases of infectious diseases have been reported in the town.

New Gloucester.

Members of the board: Dr. J. I. Sturgis, Secretary; Wm. True, Chairman; M. C. Clark.

Whooping cough has been prevalent; otherwise there have been no cases of contagious disease, except one of typhoid fever. In this case the typhoid fever circulars were distributed, disinfectants were freely used and excreta was buried.

New Limerick.

Members of the board: J. A. Grant, Secretary; F. J. Dyer, Chairman; C. A. Sheldon.

Newport.

Members of the board: F. M. Shaw, Secretary; R. H. Libby, Chairman; Dr. A. I. Harvey

Two nuisances reported to the board were removed We had two cases of diphtheria in one house. Pneumonia, mumps and the diarrhœal diseases were quite prevalent.

New Portland.

Members of the board: Dr. W. H. Stevens, Secretary; Dr S. A. Bennett, Chairman; Abel Thompson.

Three nuisances reported to the board were all removed. Two cases of typhoid fever. Whooping cough and mumps had a wide distribution. Some of the schools were suspended on account of the last mentioned disease. I would suggest for the improvement of the sanitary condition of the town, a proper disposal of excreta and sink slops, and a better ventilation of sleeping rooms.

Newry.

Members of the board: W. B. Wright, Secretary; A. W. Powers, Chairman; L. W. Kilgore.

We have had no cases of diphtheria, typhoid or scarlet fever. There were a few cases of mumps. One accident resulted from the breaking of a kerosene lamp on a hot stove.

New Sharon.

Members of the board: D. R. Hargraves, Secretary; J. R. Jewell, Chairman; D. J. Jordan.

We have had three cases of typhoid fever. Three deaths occurred from cancer. In the house where the two cases of typhoid fever occurred, we found a well under the ell. A pump which brought the water from it had an iron sink by the side of it, the bottom of which had been cracked by freezing. The sink was therefore leaky, and the contents ran upon the floor above the well. The floor was completely rotten.

New Vineyard

Members of the board: G. H. Pratt, Secretary; A. D. Turner, Chairman; E. J. Voter.

Three nuisances were reported to the board, all of which were removed Whooping cough has been present, but we have had no other cases of infectious disease. Some kind of a disease, as yet undetermined, has existed in a herd of cattle, seven out of eight dying.

Nobleboro.'

Members of the board: J. M. Winslow, Secretary; W. H. Moody, Chairman; A. Cunningham.

We have not had a case of contagious disease in town for the past year, nor has there been a nuisance complained of or existing to my knowledge.

Norridgewock.

Members of the board: P. S. Lindsey, Secretary; A. O. Frederic, Chairman; Henry Murphy.

A drain has been built in the lower part of the village. Three nuisances have been removed. Whooping cough has prevailed, but we have had no other contagious disease. More work should be done in putting in drainage.

North Berwick.

Members of the board: Geo. H. Wentworth, Secretary; L. E. Brackett, Chairman; Dr. F. B. Morrill, Member and Health Officer.

Twenty complaints have been received of nuisances, and thirty or more have been removed. Privies and sink drains have been the bane of this town, but we have made great improvements and instituted new methods that work finely. Cases of pharyngitis have been prevalent, but we have not known of any cases of diphtheria, scarlet fever, or typhoid fever.

The system of ventilation in our school-houses is ridiculous and must have attention. A sewerage system is needed. One case of accidental drowning, a boy.

Northfield.

Members of the board: E. M. Smith, Secretary; Jas. McReavy, Chairman; Frank Smith; Dr. H. H. Smith, Health Officer.

Pneumonia and the diarrhœal diseases of children have been somewhat prevalent.

North Haven.

Members of the board: B. C. Calderwood, Secretary; O. B. Kent, Chairman; Jewett Turner.

We have had three cases of typhoid fever. One death occurred from drowning. As regards kerosene accidents, a fearful one occurred here in December, in which a man, his wife and child were burned nearly to death. For a time the lives of all three were in the most extreme danger. The room was badly burned and an adjoining store barely escaped. The accident was occasioned by boiling kerosene on the stove to cleanse a tin vessel.

North Yarmouth.

Members of the board: S. H. Sweetsir, Secretary; A. Mitchell, Chairman; Wm. Osgood, Member and Health Officer.

Norway.

Members of the board: E. F. Smith, Secretary; Dr. B. F. Bradbury, Chairman; E. H. Brown.

We have had twelve cases of scarlet fever and six of typhoid fever, with two deaths from the latter disease. Erysipelas, measles and whooping cough have been unusually prevalent. Two cases of typhoid fever, both in the same family, were traced to the drinking of impure water. A sewerage system is badly needed. The work of investigating by the board has been done more thoroughly than ever before and excellent results have followed.

For some time, as your board are well aware, and as is set forth on page thirty-seven of the second annual report of the State Board of Health, Norway has been troubled with the exceedingly bad condition of the meadow lands close to the village. This same condition still continues.

Oakland.

Members of the board: H. W. Wells, Secretary; G. W. Hubbard, Chairman; Dr. M. S. Holmes, Member and Health Officer.

We have had one case of typhoid fever. No cases of scarlet fever or diphtheria. One drain relaid and enlarged by the town.

Old Orchard.

Members of the board: F. G. Staples, Secretary; Gilbert Wylie, Chairman; J. H. Ricker.

About half a mile of sewer pipe was laid. The town has been free from contagious diseases. One death occurred from drowning, and one person was killed by a runaway horse.

Old Town.

Members of the board: Dr. G. G. Weld, Secretary and Health Officer; A. Rigby, Chairman; E. R. Humphrey.

The following is taken from the printed annual report of the board:

"During the year about eight miles of water main and pipe have been laid, by means of which and the pumping station located at Old Town Falls, the several sections of the town, including the villages of Upper Stillwater, Great Works and Old Town, are supplied with Penobscot river water. No river in the State of Maine has a better surface-bed or is less affected by heavy rain storms, extreme droughts, viz: sudden and severe rain falls cause no muddy or colored appearance of the water; neither during prolonged drought, is there a lacking in volume of water, and sufficient rapidity of current, for the oxidation of organic impurities. The year 1890 was noted for two short low-water periods. The first period commencing the latter part of the month of May and ending about June 20, and the second period commencing about September 15, and ending the latter part of October. The first period was short and for that season of the year, an unusual and severe low-water period. Three cases of typhoid fever were reported, all of which were fatal. The second period was not extreme in length, or severity of drought, and the three reported fever cases recovered. The presumable places where our six fever cases originated, were Montague, town of Enfield, 1; Pea Cove, Boom House, 2; city of Bangor, 1; Greatworks village, 1; Old Town village, 1. Thus it

may be considered, that only two of our fever cases originated within the limits of the town.

"July 17th, I was notified of the existence of a few diphtheria cases, at the lower part of Old Town village. On visiting the afflicted family, found that a child several months old had died but a few hours previous, and a boy several years old very ill, and who shortly afterwards died from the severity of the disease. The disease in both cases seemed to be unusually virulent. Ordered isolation and thorough fumigation. No new cases were afterwards reported, but learned that several older persons in the immediate neighborhood had had several sore throats, presumably of diphtheritic nature, and the probable source of contagion which proved so fatal to the two children.

"During the past year more interest has been taken in the providing of better accommodations and more healthy surroundings for the several schools of our town, than had been manifested by our citizens for a number of previous years. While about thirteen thousand dollars has been expended upon our school buildings as a whole; the principal part of this amount or about eleven thousand six hundred dollars has been utilized in the construction of a fine and much needed building for the north primary, intermediate and grammar schools. The new building will accommodate from three to four hundred scholars. The Smead system is used to provide heating, ventilating and disposal of sewer matter. Being the first school building in the State to which the system as a whole had been introduced, Feb. 3d, 1891, Dr. J. O. Webster of the State Board of Health. made a thorough test of this system and in points of ventilation, heating and purity of atmosphere, all tests proved very satisfactory."

Orient.

Members of the board: Wm. McAllister, Secretary; W. H. Decker, Chairman; H. H. Bowen.

One nuisance was removed. Pneumonia has been quite prevalent. No cases of contagious diseases are reported, excepting one case of death from "fever," the case not reported to the board.

Orland.

Members of the board: R. P. Harriman, Secretary; Henry Partridge, Chairman; Dr. G. W. W. Whiting, Member and Health Officer.

We have had no cases of infectious disease.

ORNEVILLE.

Members of the board: M. W. Morgan, Secretary; Chas. Hoxie, Chairman; R. G. Herrick.

We have had no cases of contagious diseases excepting one of typhoid fever. One case of drowning.

ORONO.

Members of the board: C. P. Crowell, Secretary; Dr. J. H. Knox, Chairman and Health Officer; U. R. Penney.

Six or seven nuisances were reported to the board, all of which were removed. We have had two cases of diphtheria, three of scarlet fever and several mild cases of typhoid fever. I have no facts to report regarding diseases caused by poisoning or ventilation, unless it is in the high school building where the ventilation is defective and the privy is in the basement. Many persons object to its being there.

ORRINGTON.

Members of the board: Dr. G. B. Tibbetts, Secretary; A. N. Lufkin, Chairman; J D. Hinds.

Diphtheria one case; scarlet fever, five cases, five houses; typhoid fever, three cases, three houses. The board has had the patients isolated, houses placarded, disinfectants used freely, etc. Scarlet fever was introduced into one of the schools; the school was closed at once, the room fumigated and washed with bichloride solution 1 :1000, and the ceiling whitewashed with lime. The books infected by the sick ones were burned. Whooping cough has been prevalent.

OTIS.

Members of the board: J. R. Grant, Secretary; Luther Garland, Chairman; W. W. Tibbetts.

We have had no cases of infectious diseases, and but one death in town, that of a very aged lady.

OTISFIELD.

Members of the board: F. J. Sawyer, Secretary; D. L. Brett, Chairman; Sumner Spurr.

We have had two cases of diphtheria one of which was fatal; two houses were infected. Whooping cough has been prevalent.

OXFORD.

Members of the board: Dr. Orrin Stevens, Secretary; G. A. Poor, Chairman: S. D. Edwards.

Three nuisances have been reported. Two were removed and the other one was improved. Diphtheria, three cases, one death, two houses; typhoid fever, six cases, one death, six houses. Whooping cough was prevalent and severe. One case of drowning.

PALMYRA.

Members of the board: C. M. Jewett, Secretary; G. W. Hanson, Chairman; J. B. Chase.

Two nuisances were removed. No cases of contagious diseases have been known to the board, excepting a few of whooping cough in mild form.

PARIS.

Members of the board: Dr. F. H. Packard, Secretary and Health Officer; J. S. Wright, Chairman; Dr. I. Rounds.

Four nuisances reported to the board were removed, at least for the time being. We have had one case of diphtheria and one fatal case of typhoid fever. Whooping cough has been prevalent. An instance came under my observation in which the family used water from a brook which receives the washings from back buildings, and I have no doubt that it was the cause of the death of two persons from typhoid fever. One case of glanders in a horse. The horse was killed.

PARKMAN.

Members of the board: H. O. Ayer, Secretary; Ireson Briggs, Chairman; Dr. J. F. Butterfield, Health Officer.

We have had five cases of scarlet fever; two houses were infected. These cases were thoroughly attended to. They occurred after the outbreak in Guilford and were well marked cases of scarlet fever Not a symptom was lacking. Undoubtedly the disease was brought here from Guilford, and brought to that town in the clothing of a family that moved from the Provinces.

One serious accident occurred to a man while working in a saw mill.

Patten.

Members of the board: Dr. F. F. Bigelow, Secretary; Leroy Miles, Chairman; Dr. B C. Woodbury.

We have had no cases of infectious disease, except measles and a few cases of German measles. Drainage is needed for improving our sanitary condition. A child was burned to death by its clothes catching fire.

Pembroke.

Members of the board: Dr. J. C. Rogers, Secretary; C. [illegible] Hersey, Chairman; E. K. Smart.

Three nuisances were removed. Diphtheria, seven cases, [illegible] death, two houses; typhoid fever, four cases, two deaths, three houses. Scarlet fever went through the town in a very mild form. Only one death resulted from it.

Penobscot.

Members of the board: E. A. Sprague, Secretary and Health Officer; John Littlefield, Chairman; J. B. Snowman.

Three nuisances were removed. We have had eight cases of scarlet fever; five houses were infected. A number of the scarlet fever cases had no medical attendance and were not reported. Two drowning accidents and one accident in the woods resulted fatally.

Perkins.

Members of the board: W. A. Lewis, Secretary; B. F. Curtis, Chairman; T. A. Hinckley.

We have had no cases of infectious diseases.

Perry.

Members of the board: G. P. Ricker, Secretary; F. L. Gore, Chairman; J. B. Nutt.

We had one fatal case of diphtheria in the person of a young lady who had been visiting at Eastport where diphtheria prevailed. Others were exposed to this case before its nature was known, but fortunately no one else took the disease.

Peru.

Members of the board: A. B. Walker, Secretary; Otis Wyman, Chairman; E. A. Eastman.

We have had nineteen cases of scarlet fever. Seven houses were infected. These cases were very mild.

PHILLIPS.

Members of the board: B. E. Pratt, Secretary; Dr. C. L. Toothaker, Chairman; E. M. Robinson.

Two nuisances were removed. We have had one case of typhoid fever in each of two houses. Pneumonia and German measles prevailed.

PHIPPSBURG.

Members of the board: C. V. Minot, Jr., Secretary; Geo. Duley, Chairman; F. S. Bowker; Dr. W. H. Ferguson, Health Officer.

We have had one case of diphtheria. Whooping cough prevailed, and on account of it, it was deemed advisable to close the schools. The well at a boarding house was subjected to pollution, and, in accordance with the advice of the board, the use of the water from it was discontinued.

On the 22d of January, 1890, a house was burned. It was an old-fashioned brick structure. It seems that the attic was used as a sleeping apartment, and, on the night of the fire, the bed of one of the occupants was found to be afire. All immediately left the attic but, in the hope of saving some of their property, some of them returned, among whom was a boy aged about fifteen. He went off by himself, the others thinking to save the house seized upon the bed and got it stuck in the stairway thus blocking all egress in this direction. There were windows in each of the gable ends, but it seems that these had been boarded up and thus unwittingly the boy was imprisoned. When they got him out he was badly burned about the back, and the flesh was hanging in shreds to his hands. He lived about two weeks after the accident.

PITTSFIELD.

Members of the board: Dr. T. M. Griffin, Secretary and Health Officer; H. C. Pooler, Chairman; David M. Parks.

Six nuisances were removed. We have had two fatal cases of typhoid fever, one in each of two houses. Better sewerage is needed.

PITTSTON.

Members of the board: John Scott, Secretary.

Plymouth.

Members of the board: Dr. W. H. Merrill, Secretary; S. P. Gifford; J. F. Longley.

We have had no cases of infectious diseases. An epidemic of diarrhœal diseases of children occurred in the latter part of September, immediately after the heavy rainfall.

Poland.

Members of the board: Dr. E. F. Bradford, Secretary and Health Officer; S. L. Littlefield, Chairman; B. M. Fernald.

Four nuisances were removed. We have had one questionable case of diphtheria and ten cases of typhoid fever. More sewerage is needed.

Porter.

Members of the board: Dr. E. R Chellis, Secretary and Health Officer; Daniel Wentworth, Chairman; Amos Blazo.

Three nuisances have been removed. No cases of diphtheria, scarlet fever or typhoid fever. Pneumonia and the diarrhœal diseases of children were prevalent. Bad drainage and the drinking of surface water prevails in some places. As a village, we should improve our supply of drinking water.

Portland.

Members of the board: Geo. C. Burgess, Secretary; Dr. C. D. Smith, Chairman; Dr. A. K. P. Meserve; J. H. Sayward, Inspector.

The new reservoir of 20,000,000 gallons capacity has done good service during the year. There have been built 2,829 feet of new sewers. We have had no unusual trouble or difficulty in securing abatement of nuisances, but a disposition has been shown on all hands to comply with the requests of the board

Diphtheria, thirty-one cases, six deaths; scarlet fever, fifteen cases, one death; typhoid fever, fifty-five cases, three deaths. In connection with cases of contagious diseases infected houses are placarded, the premises are examined by the inspector, the schools and the public library are notified, and circulars of instruction are furnished. Upon the termination of the case and disinfection of the premises, the placard is removed from the house.

From the middle of October to the end of the year there prevailed here a fever resembling typhoid, but lacking some of its

characteristic symptoms. It was a "continued fever" and might perhaps be called atypical typhoid fever. There were many more cases of pneumonia and diarrhœal diseases of children in 1890 than in the preceding year. *La grippe* was very prevalent and largely affected the rate of mortality. In the four weeks ending February 1st, the number of deaths was 101; from pneumonia alone, 24.

Nineteen serious accidents occurred during the year. They were as follows: Burned at a stove, 1; crushed by an iron bar, 1; falls, 6; run over by a carriage, 1; shot, 1; fracture of skull by a blow, 2; drowned, 3; railroad accidents, 2; smothered in bed, 1.

House to house inspections have been continued with good results. The following is a summary of the Health Inspector's report for the year:

No. of formal complaints to Secretary or inspector	230
" " vaults found in bad condition	617
" " overflowing vaults	9
" " overflowing cess-pools	4
" " cellars in bad condition	353
" " water closets inspected	906
" found in good condition	721
" " in bad condition	185
" of swine ordered removed	8
" " vaults built: no sewer in street	1
" " water closets ordered built	116
" " bad sink-drains, rubbish heaps, filth, etc., ordered fixed or removed	445
" " sinks found without traps	214
" " visits made on account of contagious diseases	100
" " vaults found in good condition	109
" " cellars found in good condition	390
" " sink-drains found in good condition	658
" " yards found in good condition	132
" " visits made, unclassified, chiefly to see that orders are carried out or to find parties of whose premises complaint is made	1,086

Pownal.

Members of the board; S. A. Vosmus, Secretary; I. S. Brown, Chairman. H. B. True.

We have had one case of diphtheria and one of typhoid fever. We have tried to carry out the advice given by the State Board in dealing with cases of this kind. Whooping cough and pneumonia have been prevalent.

Prentiss.

Members of the board: J. F. Belden, Secretary; E. E. Butters, Chairman; T. N. Butterfield.

We have had one case of diphtheria and seven of scarlet fever. Measles has been present.

Presque Isle.

Members of the board: Dr. Frank Kilburn, Secretary; Dr. G. H. Freeman, Chairman; C. P. Allen.

Three nuisances were removed. Scarlet fever, thirty-seven cases, four deaths, ten houses infected; typhoid fever, three cases, two houses. Dysentery was quite prevalent during the month of October, but only one death was reported. Several of the cases appeared to be due to polluted water.

The largest number of cases of scarlet fever occurred in the southern part of the town and were due to importations from Fort Fairfield. One young man who had not fully recovered from the disease visited his parents and a number of other houses in the vicinity, and this caused quite an extensive spread before we were notified.

Princeton.

Members of the board: S. G. Spooner, Secretary and Health Officer; James Spencer, Chairman; Henry Heald.

We have had six cases of scarlet fever to the end of the year, and there have been a few cases of pneumonia, two of which among children were fatal.

Prospect.

Members of the board: O. B. Gray, Secretary; Geo. Avery, Chairman; G. W. Crockett.

We have had no cases of contagious diseases the past year.

Randolph.

Members of the board: B. A. Cox, Secretary; G. L. Smith, Chairman; Benj. Clark.

Two nuisances were removed. Diphtheria, five cases, one death, three houses. Scarlet fever, two cases, two houses; typhoid fever, one case. Infected houses have been placarded and all proper care has been taken against the spread of these diseases. Whooping cough was quite largely present and there were a few cases of measles. Our cases of contagious diseases have been in some of our best families and in cleanly neighborhoods. One death occurred from an accident in a mill For the improvement of the village, sewers, sewers, sewers, is the need.

We had one puerperal case of diphtheria which ended fatally. Two other cases of ordinary diphtheria followed in the same house; both of these recovered

Rangeley.

Members of the board: Dr. S. A. Ross, Secretary and Health Officer; J. F Herrick, Chairman; Daniel Hoar.

Two nuisances were removed. We have had no cases of contagious disease.

Raymond.

Members of the board: H. M. Cash, Secretary; L. W. Welch, Chairman; Albert Wilson.

One nuisance was removed. Diphtheria, five cases, five houses; typhoid fever one case. In many cases the healthfulness of dwelling houses in this town would be improved by better drainage from the kitchen sink, and by the removal of the privy farther from the dwelling. A young married woman died as the result of swallowing Paris green.

Readfield.

Members of the board: Dr. E S. Hannaford, Secretary and Health Officer; Prof. W. F. Morse, Chairman; A. W. Brainerd.

Ripley.

Members of the board: A. G. Farrar, Secretary; A. R Dunlap, Chairman; W. H. Lombard

We have had no cases of contagious diseases, excepting two or three of whooping cough Pneumonia has been prevalent Several animals in the herd of John Nutter were pronounced by the veterinary surgeon to have pneumonia. He has lost two or three head of cattle.

Robbinston.

Members of the board: F. R. Leach, Secretary; Alonzo Smith, Chairman; N. E. Campbell.

We have had two cases of diphtheria, one in each of two houses, and one case of typhoid fever. The local board has attended to its duties promptly as soon as notified of each case.

Rockland.

Members of the board: Dr. E. E. Hitchcock, Secretary and Health Officer; Hon. C. E. Littlefield, Chairman; O. H. Tripp.

Several new sewers have been built in accordance with the survey made in 1888. Fifty-six nuisances have been reported, all of which were attended to. We have had no cases of diphtheria or typhoid fever, but a death occurred from scarlet fever. I would suggest for the improvement of the sanitary condition of the city the continuance of work on the sewerage system.

Rome.

Members of the board: L. G. Martin, Secretary; J. E. Farnham, Chairman; G. S. Tibbetts.

We have had one case of typhoid fever, in which we secured the co-operation of the attending physician in advising as to disinfection and the disposal of excreta.

Roxbury.

Members of the board: A. W. Robbins, Secretary; S. M. Locke, Chairman; John Reed.

No contagious diseases are reported.

Rumford.

Members of the board: H. F. Abbott, Secretary; H. M. Colby, Chairman; Wilson Thomas.

Saco.

Members of the board: Dr. L. D. Dennett, Secretary; Dr. J. D. Cochrane, Chairman; Dr. W. T. Goodale.

Our so-called Woodbury brook sewer has been completed. Sixteen nuisances were reported to the board, all of which were

removed. Diphtheria, one case; scarlet fever, one case; typhoid fever, three cases; but no deaths resulted from these diseases.

We have, since June 26, 1890, had forty-seven deaths from the following causes: consumption, 15; heart disease, 7; pneumonia, 3; cancer, 3; chronic bronchitis, 1; meningitis, 2; membranous croup, 1; apoplexy, 2; paralysis, 3; chronic diarrhœa, 1; cholera infantum, 3; old age, 2; infantile weakness, 1; unknown, 1; total, 47.

Salem.

Members of the board: Geo. W. Harris, Secretary; Albert H. Perry, Chairman; Geo. E. Willis.

One nuisance was removed. We have had one case of typhoid fever.

Sanford.

Members of the board: Geo. E. Allen, Secretary; A. B. Sanborn, Chairman; H. T. Bennett, Dr. J. H. Neal, Health Officer.

The Springvale Water Company has improved and extended their system of water supply. Five nuisances reported to the board were all removed. Scarlet fever, twenty cases, fourteen houses; typhoid fever, thirty-one cases, four deaths, twenty-one houses. One case of cerebro-spinal meningitis occurred. The typhoid fever has not been confined to any one locality but has prevailed over the entire town. The cause appears to be referable to the unusually wet season of 1890. The cases of scarlet fever were in the village of Springvale. It was of a very mild type and no deaths occurred from the disease. No cause was known, as the utmost caution was exercised in every case by the board.

Sangerville.

Members of the board: H. C. Ford, Secretary; C. F. Dearth, Chairman; Dr. C. W. Ray, Member and Health Officer.

Two nuisances were reported to the board, one of which was abated. Diphtheria, two cases, one death, one house; typhoid fever, one fatal case. More thorough drainage is needed in the village.

Scarboro.

Members of the board: Dr. J. B. Thornton, Secretary; B. F. Carter, Chairman; M. I. Milliken.

Four nuisances were removed. We had one fatal case of typhoid fever.

Searsmont.

Members of the board: J. W. Farrar, Secretary; P. S. Wing, Chairman; Dr. A. Millett.

No cases of contagious diseases.

Searsport.

Members of the board: Dr. E. W. Gould, Secretary; J. G. Pendleton, Chairman; Jos A. Clement.

One nuisance was removed. We have had four cases of small-pox, with one death, and two fatal cases of diphtheria. Prompt isolation and disinfection have been carried out in connection with these cases. The small-pox patients were removed to the pest-house, and all infected houses were disinfected. Two short sewers in the village would improve the condition of things. The two cases of diphtheria occurred in a house with no cellar, and situated in a hollow where there was no drainage and where the surroundings were bad from a sanitary point of view.

Sebago.

Members of the board: B. F. Cole, Secretary; Loren Bachellor, Chairman; W. W. Haley.

No cases of diphtheria, scarlet fever or typhoid fever are reported.

Sedgwick.

Members of the board: M. L. Elwell, Secretary; Dr. R. E. Hagerthy, Chairman; J. W. Penny.

Some improvements have been made in drainage and in disposing of excreta. There have been two cases of diphtheria.

Shapleigh.

Members of the board: Dr. F. A. Bragdon, Secretary and Health Officer; John Pugsley, Chairman: Dr. L. W. Leighton.

Diphtheria, three cases, one house; scarlet fever, ten cases, three houses; typhoid fever, one case. No deaths resulted from these diseases.

SHERMAN.

Members of the board: L. C Caldwell, Secretary; G. W. Durgin, Chairman; Dr. D. H. Owen.

We have had no cases of contagious diseases More thorough drainage is needed around many premises and better ventilation of private and public buildings. I think, however, that more interest is now taken in these matters and in regard to the method of disposal of excreta than was formally the case.

SHIRLEY

Members of the board: Henry Blackstone, Secretary; A. T. Mitchell, Chairman; J. Dennen.

We have had no cases of contagious disease except two of measles. We have also had two cases of pneumonia. I should like to see our little village supplied with water from some of the large springs on the hills, three-fourths of a mile away.

SIDNEY.

Members of the board: Dr. Daniel Driscoll, Secretary and Health Officer; Charles Goodhue, Chairman; Ambrose Sawtelle.

One nuisance has been removed. We had one case of typhoid fever imported into the town. Thorough cleanliness and disinfection were enforced. Whooping cough has been prevalent. With the exception of influenza the year has been a remarkably healthy one. The summer months were free in great measure from the usual bowel difficulties of children.

SKOWHEGAN.

Members of the board: Geo. Cushing, Secretary; Dr. S. A. Patten, Chairman and Health Officer; S. A. Bickford.

We have a perfect water supply and the sewerage was extended the whole length of Court street, besides being built at other points in the town. Eight nuisances have been reported, six of which have been removed. We had an outbreak of diphtheria in which ten cases occurred and four houses were infected. Whooping cough has prevailed.

On account of the outbreak of diphtheria, one school was closed and the building was properly disinfected. Two localities especially are lacking in drainage. One case of drowning and two accidents by burning, one of which resulted fatally.

SMITHFIELD.

Members of the board: W. J. Haynes, Secretary; I. W. Varney, Chairman: C. N. Simonds.

We have had two cases of typhoid fever, one of which ended fatally. Otherwise than these, no cases of contagious diseases have come to our knowledge.

SMYRNA.

Members of the board: A. J. Berry, Secretary; A. P. Daggett, Chairman; H. C. Douley.

SOLON.

Members of the board: S. F. Greene, Secretary; Stephen Merrill, Chairman; Jotham Whipple.

We have had no cases of diphtheria, typhoid, or scarlet fever. No disease has been unusually prevalent except *la grippe*.

SOMERVILLE.

Members of the board: Morrill Glidden, Secretary; A. L. Soule, Chairman; J. E. Bartlett.

We have had no cases of diphtheria, typhoid, or scarlet fever, but whooping cough has been present.

SOUTH BERWICK.

Members of the board: Dr. E. D. Jaques, Secretary and Health Officer; Dr. C. P. Gerrish, Chairman; Dr. G. D. Emerson.

SOUTHPORT.

Members of the board: W. T. Maddocks, Secretary; Albert McKeown, Chairman; Sumner Orne.

SOUTH THOMASTON.

Members of the board: Dr. Geo. C. Horn, Secretary; Capt. E. Tolman, Chairman; John Alexander.

Scarlet fever, five cases in one house; typhoid fever, one fatal case. Two deaths occurred from accidents at sea or on board vessels.

SPRINGFIELD.

Members of the board: Dr. P. H. Jones, Secretary; E. C. Ryder, Chairman; C. R. Brown.

St. Albans.

Members of the board: Dr C. A. Moulton, Secretary; N. H. Vining, Chairman; N. B. Turner.

Two nuisances were removed. One case of typhoid fever and one of cerebro-spinal meningitis.

Standish.

Members of the board: D. L. Warren, Secretary; M. S. Spear, Chairman; C. D. W. Shaw.

Scarlet fever, eight cases, one death, six houses infected. The infected houses were placarded, infectious children were excluded from the school, and the houses were disinfected.

Stark.

Members of the board: Thos. Buswell, Secretary; B. F. Yeaton, Chairman; J. F. Frederic.

One nuisance was removed. Typhoid fever, four cases, one death, three houses. As soon as I have been notified, I have visited the infected premises immediately and arranged to prevent the spread of the infection.

Stetson.

Members of the board: Dr. J. W. Tibbetts, Secretary and Health Officer; C. W. Wentworth, Chairman; G. M. Bond.

Two nuisances were removed. We have no cases of diphtheria, typhoid or scarlet fever, but there was an epidemic of mumps. Better sewerage is needed in the village.

Steuben.

Members of the board: B. W. Stevens, Secretary; G. W. Moore, Chairman; M. S. Smith; Dr. S. B. Overlock, Health Officer

The drainage in Steuben is excellent and the water, except in a few cases, is nearly as pure as can be found in wells.

We have had seven cases of diphtheria and three of typhoid fever, none of which proved fatal. In one case of diphtheria, we excluded from the school all the scholars in the immediate vicinity. One boy seven years old fell between the wheels of a wagon and had his legs so badly broken that he died during amputation.

St. George.

Members of the board: Dr. A. Woodside, Secretary; H. F. Kalloch, Chairman; W. H. Mathews.

One nuisance was removed. Scarlet fever, two cases, one house; typhoid fever, two cases, two houses. Whooping cough and pneumonia have prevailed. One death by drowning.

Stockton Springs.

Members of the board: Dr. G. A. Stevens, Secretary and Health Officer; J. W. Thompson, Chairman; J. F. Hichborn.

We have had two cases of typhoid fever in one house.

Stoneham.

Members of the board: W. L. Goodwin, Secretary; N. H. Palmer, Chairman; H. McAllister.

No cases of diphtheria, typhoid, or scarlet fever are reported, but whooping cough was prevalent. Infectious scholars were kept away from the schools.

Stow.

Members of the board: F. E. Guptill, Secretary; O. P. Charles, Chairman; O. R. Barrows.

One nuisance was removed. No cases of diphtheria, typhoid, or scarlet fever. Three cases of measles. Whooping cough was quite prevalent, and we had one case of pneumonia.

Strong.

Members of the board: J. W. Porter, Secretary; Dr. G. Z. Higgins, Chairman; M. B. Will.

We had one mild case of diphtheria and prompt action was taken to prevent the spread of the infection.

Sullivan.

Members of the board: Dr. W. W. Bridgham, Secretary and Health Officer; M. H. Hawkins, Chairman; M. E. Rideout.

Three nuisances were reported. Diphtheria, one case; scarlet fever, three cases, two houses. Whooping cough and the diarrhœal diseases have been prevalent. I think if the cases of diphtheria and scarlet fever had not been under the care of the local boards

of health of Franklin and Sullivan, we would have seen a repetition of those scourges which formerly visited them. By prompt action they were checked at once and restricted to narrow limits.

Sumner.

Members of the board: Sharon Robinson, Secretary; L. H. Bisbee, Chairman; Dr. C. M Bisbee, Health Officer.

Scarlet fever, four cases, one house; typhoid fever, one case. Whooping cough was prevalent.

Surry.

Members of the board: Dr. W. E. Emery, Secretary and Health Officer; Aug. Milliken, Chairman; D. G. Means.

One nuisance was removed. Diphtheria, three cases, one house; scarlet fever, five cases, two houses; typhoid fever, seven cases. No deaths resulted from these diseases. The places where diphtheria and scarlet fever occurred were visited, the houses placarded, isolation provided for, and persons, clothing, and rooms disinfected. Whooping cough has prevailed.

Swanville.

Members of the board: H. E. Greeley, Secretary; C. M. Marden, Chairman; Z. L. Downs.

No cases of contagious diseases reported.

Sweden.

Members of the board: W. H. Gordon, Secretary; O. R. Maxwell, Chairman; Elden Brown.

We have had no cases of diphtheria, typhoid or scarlet fever and no disease has been unusually prevalent.

Talmage

Members of the board: F. R. Neal, Secretary and Chairman; H. F. Dunsmore; G. W. Witham.

Temple.

Members of the board: S. R. Norton, Secretary; L. H. Farmer, Chairman; G. W. Staples.

No contagious diseases have been reported.

THOMASTON.

Members of the board: Dr. H. C. Levensaler, Secretary and Health Officer; J. H. H. Hewitt, Chairman; Dr. J. E. Walker.

Five nuisances were reported to the board, the most of which were removed. The worst of the nuisances has been the spreading of offal from slaughter houses on land to the annoyance of near residents, and the carrying of dead animals on fields and leaving them unburied. Scarlet fever, four cases; typhoid fever, two cases. The diarrhœal diseases of children were quite prevalent. A thorough system of sewerage is required. Efforts were made at the annual meeting to establish such a system, but the town voted it down. One case of lead poisoning contracted at sea produced really locomotor ataxia in all its symptoms. Recovered.

THORNDIKE.

Members of the board: V. N. Higgins, Secretary; J. C. Whitney, Chairman; R. S. Ward.

We are happy to say that Thorndike has been a very healthy town. No cases of contagious diseases.

TOPSFIELD.

Members of the board: C. T. Day, Secretary; W. H. Littlefield, Chairman; L. Tupper.

TOPSHAM.

Members of the board: J. C. Purington, Secretary; R. P. Whitney, Chairman; D. S. Colby.

Five nuisances were removed. Typhoid fever, three cases, one death. Pneumonia was quite prevalent. On account of the prevalence of rabies, we posted a notice in the latter part of June, that all dogs without a muzzle would be shot by the police. The requirement of muzzling was very fully complied with, and we only had one mad dog, which was promptly shot. Muzzles were ordered off September 1st.

TREMONT.

Members of the board: Dr. W. A. Spear, Secretary; James T. Clark, Chairman; J. H. Gilley.

Five nuisances were removed. We have had no cases of diphtheria or typhoid fever, and only one of scarlet fever. Pneumonia has been prevalent.

TRENTON.

Members of the board: K. K. Thompson, Secretary; W. G. Bunker, Chairman; D. B. Alley.

We have had no cases of contagious diseases excepting whooping cough in a mild form.

TRESCOTT.

Members of the board: John Sanders, Secretary; W. H. Leighton, Chairman; S. A. Wilcox.

We have had no cases of diphtheria, typhoid or scarlet fever. Pneumonia was more prevalent than usual

TROY.

Members of the board: Dr. M. T. Dodge, Secretary; O. B. Rhoades, Chairman; John Woods.

We have had no cases of contagious diseases. Pneumonia was unusually prevalent, fifteen cases occurring with one death. One death resulted from a gun shot, and one from a falling tree. A case of lead poisoning occurred in a young man learning the carriage painter's trade. Recovery.

TURNER.

Members of the board: Dr. Roscoe Smith, Secretary; J. H. Conant, Chairman; H. C. Haskell.

One nuisance was abated. Diphtheria, thirty-one cases, fifteen houses infected; typhoid fever, one case. Whooping cough has been prevalent.

On the 5th of October the board of health was notified that there were four cases of diphtheria in two families in the north part of the town. The members of the board immediately went to the place and found two patients in each family suffering with diphtheria. The houses were placarded, circulars treating of diphtheria were left with the family, the necessary instructions were given them, and the importance of carrying out to the letter the requirements of the quarantine, and, lastly, thorough fumigation of the premises and clothing, and washing the whole cutaneous surface were made particularly prominent

Our attention was now directed to the origin of the disease. We found, in the families of the near neighbors, a little girl, who, while

on a visit in the state of Massachusetts was sick with sore throat and who, on her recovery returned home. Soon after her arrival, a brother had sore throat which lasted a few days. Not suspecting the nature of the disease a physician was not called. The children in these two families now suffering with diphtheria, had, a few days before they were taken sick, visited this family and played with these children who had just recovered from an attack of sore throat. The children now sick were attending school in a small building some two and a half miles from their home, and were at school when their throats commenced to be sore. The school was immediately closed. Three days after the attack of these children, the teacher and six of his pupils were attacked, representing as many different families. The same disposition was made of them as of the first families. They were isolated; no one but the nurse was allowed to go into the room where they were sick. The quarantine was so scrupulously enforced that, from these last cases, there were but two other families in the village and the vicinity that took the disease.

From the families that first had the disease, it spread into other families; but its communication can be easily traced, and the main reason of this spread was a lack of strict isolation which was due to a lack of hearty co-operation of the attending physician. But by a persistent effort on the part of the board of health, the disease had been so thoroughly surrounded by safeguards that its further spread was impossible, and its career was ended. There have been twenty-nine cases without a single death. The type was mild. These cases were not treated by one physician, but there were four. I have no doubt that the cases were diphtheria.

Union.

Members of the board: B. Buxton, Secretary; E. R. Daniels, Chairman: A. J. Young.

Diphtheria, one fatal case; scarlet fever, two cases; typhoid fever, five cases, two deaths.

Unity.

Members of the board: Dr. Jas. Craig, Secretary; John Perley, Chairman; B. F. Kelley.

We have had no cases of contagious diseases. Pneumonia was very prevalent. A better water supply is needed in many places,

and the drainage of one place where stagnant water stands would effect an improvement.

UPTON.

Members of the board: F. B. Brooks, Secretary; H. T. Chase, Chairman; H. M. Lambard.

We have had no cases of contagious disease.

VANCEBORO.

Members of the board: C. A. Sterling, Secretary; Capt. Chas. Cobb, Chairman; Geo. H. Peva; Dr. M. L. Young, Health Officer.

Ten nuisances were reported all of which were removed. We have had eighteen cases of scarlet fever, distributed in six houses. No deaths resulted from them. If possible the isolation of these cases was secured; if not, the house was quarantined, placarded, and disinfection carried out. Rheumatic fever was more prevalent than usual, as also were pulmonary diseases following influenza.

The outbreak of scarlet fever originated obscurely I learned of two children being sick for a day or two and then returning to school I went to the school-room and found them in the stage of desquamation. The school was closed, but four houses were infected nearly simultaneously This occurred in June. In September, a dance was held in a private family, and a visitor to the village attended. This was followed by another epidemic, as the visitor, I have since learned, came direct from an infected house, transporting the contagion about fifty miles.

VASSALBORO.

Members of the board: Dr. G. L Randall, Secretary; C. S. Stilson, Chairman; Dr. C. Mabry.

Scarlet fever, four cases, two houses; typhoid fever, three cases, three houses. When cases of contagious diseases have been reported, the action of the board has been prompt, decisive, and thorough

The inhabitants of this town have shown a willingness to help the local board all they can, with one exception They are cleanly in their habits, intelligent, and seem to have a large degree of sanitary knowledge. The secretary has kept the citizens supplied with useful information received from the State Board of Health which

..as been timely and valuable. There is an urgent need of the ..horough re-vaccination of this town

VEAZIE.

Members of the board: L. H. Parke, Secretary; J. B. Skinner, Chairman; A. J. Spencer.

Large improvements have been made in water supply, drainage, and sewerage. Three nuisances were removed without expense to the town. No cases of infectious diseases have been reported. Several cases of pneumonia, but none fatal, and one fatal case of cerebro-spinal meningitis. Two accidents occurred by falling, one from a building, resulting in broken ribs, the other on the ice, fracturing the leg. A boy was accidently shot and instantly killed.

VERONA.

Members of the board: A. H. Whitmore, Secretary; Jos. Allen, Chairman; Peter Allen.

We have had no cases of diphtheria, typhoid, or scarlet fever

VIENNA

Members of the board: L. C. Davis, Secretary; H. Porter, Chairman; Elbridge Allen.

Four nuisances were reported all of which were removed. Typhoid fever occurred in two houses, with three cases, but no deaths resulted.

VINALHAVEN.

Members of the board: Dr. F. A. Smith, Secretary; J. A. Babbige, Chairman; O. H. Lewis.

One nuisance was removed. We have had sixteen cases of scarlet fever with one death, and two deaths from pneumonia. *La grippe* was very severe and two deaths were caused by it. We need better sewerage, but the soil in many places is not deep enough to lay a sewer below the frost. The people here are quite ready to do anything to improve the sanitary condition of their premises.

WAITE.

Members of the board: J. C. Neale, Secretary; J. B. Phelps, Chairman; Joseph Bagley.

Scarlet fever, three cases, two deaths, one house; typhoid fever, one case. There was one fatal case of pneumonia.

WALDO.

Members of the board: G. C. Harding, Secretary: A. J. Simmons, Chairman; J. D. Webster.

One nuisance was removed. Scarlet fever, two cases, one house. No other diseases have been unusually prevalent.

WALDOBORO.

Members of the board: F. M. Eveleth, Secretary; C. P. Hovey, Chairman; E. Farrington.

We have had one case of scarlet fever and one of typhoid. Measles prevailed as an epidemic with a few cases of pneumonia following, but with no deaths.

WALES.

Members of the board: B Hodsdon, Secretary; A. M. Donnell, Chairman; T. T. Jenkins.

One nuisance was removed. We have had one case of scarlet fever. In this case the family was informed of the danger of spreading the disease, what to do to prevent it, and how to have the house and clothing cleansed. Some of the school-house privies need attending to. We would suggest for the improvement of the sanitary condition of the town, the reading of the *Sanitary Inspector* and the heeding of its instructions.

WALTHAM.

Members of the board: Hannah S. Fox, Secretary; M. Haslam, Chairman; Alden Haslam.

We have had no cases of contagious diseases.

WARREN.

Members of the board: Dr. J. M. Wakefield, Secretary and Health Officer; W. O. Counce, Chairman; B. B. Libby.

Two cases of diphtheria occurred in two houses and typhoid fever in four, two deaths resulting from the latter disease. Pneumonia was unusually prevalent. Pure water and better drainage are

needed The people are always ready to assist the local board in the discharge of its duties.

Washburn.

Members of the board: Dr. P. J. Conroy, Secretary and Health Officer; C. L. Stoddard, Chairman; A. W. Stratton.

Two nuisances were removed Scarlet fever, fifteen cases, four deaths, ten houses; typhoid fever, six cases. Drainage is needed in some places, and better water than that obtained from the shallow wells. One girl was nearly burned to death by her dress catching fire after it had been saturated with kerosene.

Washington.

Members of the board: T. S. Bowden, Secretary; J. F. Davis, Chairman; E. A. Sidlinger.

Two nuisances have been removed. Typhoid fever, five cases, two deaths, two houses; pneumonia has been unusually prevalent. Better ventilation is needed, especially of school-houses. One citizen was thrown from a wagon, resulting in a fractured leg, necessitating amputation. Another person fell from a building and broke his leg, but recovered.

Waterboro.

Members of the board: C. W. Patterson, Secretary; Dr. J. T. G. Emery, Chairman and Health Officer; George P. Chase.

We have had no cases of diphtheria, scarlet fever, or typhoid fever. Several cases of pneumonia occurred and a large number of children have had chicken-pox. A bad accident occurred by the explosion of a gallon can of boiling coffee into a man's face. Several persons were cut by saws in the mills.

Waterford.

Members of the board: C. L. Wilson, Secretary; Dr. C. M. Coolidge, Chairman; Melville Monroe.

We have had no cases of diphtheria, scarlet fever, or typhoid fever.

Waterville.

Members of the board: C. R. McFadden, Secretary; Dr. M. H. Holmes, Chairman; G. A. Alden; Dr. F. C. Thayer, Health Officer.

Our system of sewerage has been extended, and is now first-class in nearly all the streets of the city. No nuisances have come under our observation, excepting those caused by sink spouts and privy vaults Many of these have been removed. Diphtheria, six cases, four deaths, six houses. One death occurred from drowning.

Wayne.

Members of the board: Dr F. L. Chenery, Secretary; Dr. C. H. Barker, Jr., Chairman; W. Jennings.

We have had no cases of diphtheria or scarlet fever, but have had one fatal case of typhoid fever.

Webster.

Members of the board: J. G. Jordan, Secretary; A. J. Larrabee, Chairman; T. C. Billings.

Some improvements have been made in drainage at the village. One nuisance was removed. We have had no cases of contagious diseases, except whooping cough. Pneumonia was quite prevalent.

Weld.

Members of the board: Dr. C. E. Proctor, Secretary and Health Officer; A. E. Houghton, Chairman; L. L Jones.

We have had one case of diphtheria. Pneumonia was quite prevalent and German measles and whooping cough early in the year. Better water supplies and drainage would effect sanitary improvements.

Wesley.

Members of the board: Samuel Hawkins, Secretary; Jeremiah Driscoll, Chairman; J. W. Day.

There was one case of typhoid fever.

Westbrook.

Members of the board: H K. Griggs, Secretary; Dr. A. H. Burroughs, Chairman; H. T. Clark.

Ten nuisances were reported, nine of which were removed. Diphtheria, eight cases; six houses; scarlet fever, seven cases; typhoid fever, thirteen cases. These cases have received immediate attention, isolation is enforced, houses are placarded, circulars

of instruction left, and fumigation and disinfection done at the proper time.

Between the villages of Saccarappa and Cumberland Mills there is a flat piece of ground which has been built over within a few years. I suppose building lots were bought there because they were cheap. The cellars are usually wet; in fact it is a difficult locality to drain. The result is that typhoid fever finds its home there nearly every season. When the expense from loss of time and doctor's bills are taken into account, there is no economy in building on low, wet ground, even if the lot is gratuitous.

Last spring the town voted $5,000 for sewers and drains to be expended by the selectmen, subject to the recommendation of the board of health.

West Gardiner.

Members of the board: S. M. Pinkham, Secretary; D. E. Merrill, Chairman; W P. Haskell.

There were no cases of diphtheria, scarlet fever, or typhoid fever, but pneumonia and whooping cough were prevalent, and there were a good many cases of *la grippe*. One case of drowning.

Weston.

Members of the board: Geo. W. Brannen, Secretary; Geo. Moody, Chairman; Greenlief Marble.

There have been no cases of contagious diseases. Our town has been unusually healthy the past year.

Westport.

Members of the board: S. P. Webber, Secretary; Jas. Thomas, Chairman; Wilmot Greenleaf.

We have had one fatal case of typhoid fever.

Whitefield.

Members of the board: Dr. W. Johnson, Secretary and Health Officer; C. J. Skehan, Chairman; E. C. Jewett.

There were no cases of diphtheria, scarlet fever or typhoid fever. Whooping cough and pneumonia have prevailed, and there were cases of influenza in nearly every house in town.

WHITING.

Members of the board: W. I. Crane, Secretary; A. M. Crane, Chairman; Judson Hall.

We have had no cases of contagious diseases.

WHITNEYVILLE.

Members of the board: W. M. Flynn, Secretary; D. W. Rollins, Jr., Chairman; M. E. Bridgham.

Scarlet fever, three cases, two outbreaks, two houses infected. The infected houses were placarded, school teachers notified and suggestions as to proper management offered. Influenza was quite prevalent, but generally in a mild form. To improve the sanitary condition of the town I would suggest the dry earth closet for the old time privy, and better house and stable drainage. The only accident which occurred was the instant death of one man by lightning. A throat and head disease has been somewhat prevalent among horses.

WILLIAMSBURG.

Members of the board: A. Merrill, Secretary; M. W. Kennison, Chairman; L. T. Pitman.

We have had no cases of the contagious diseases, except one case of influenza which proved fatal.

WILLIMANTIC.

Members of the board: F. Hart, Secretary; E. Floyd, Chairman.

One nuisance was removed. We have had no cases of the infectious diseases. Influenza was quite prevalent, but generally in a mild form. A young man, twenty years old, had one hand slightly bruised in taking care of his horse, and got cold in it and died in a few days with what was called blood poisoning

WILTON.

Members of the board: Dr. A. B. Adams, Secretary and Health Officer; J. T. Wilkins, Jr., Chairman; F. F. Noyes.

We have had two cases of typhoid fever. We had a large number of cases of influenza.

WINDHAM.

Members of the board: Dr. I D Harper, Secretary; Dr. A. N. Witham, Chairman; C. A. Nichols.

Three nuisances were removed. We have had three cases of diphtheria, and three cases of typhoid fever with one death. Whooping cough was prevalent, and *la grippe* affected the majority of the people. One school was closed one week on account of whooping cough. A man was killed in the pulp mill at South Windham. One cow died of tuberculosis.

WINN.

Members of the board: A. L Hall, Secretary; W. F. Lovejoy, Chairman; Jas. Rice; Dr. F. W. Merrill, Health Officer.

There have been no cases of the infectious diseases. Pneumonia was prevalent.

WINSLOW.

Members of the board: J. W. Bassett, Secretary; B. F. Towne, Chairman; Geo. S. Lernerd.

One nuisance was removed. We have had no cases of contagious diseases.

WINTERPORT.

Members of the board: Dr. C. F. Atwood, Secretary; John R. Carleton, Chairman; Dr. A. R. Fellows.

Diphtheria, three cases, two houses. The houses were placarded, State Board literature was circulated in the neighborhood, communication was prohibited, and scholars from the infected houses kept home from school. The experience of our board has not suggested any changes which ought to be made in the health laws of the State, but we would *insist* that the present law be rigidly, but carefully enforced.

WINTHROP.

Members of the board: Dr. C. A. Cochrane, Secretary and Health Officer; C. A. Wing, Chairman; G. R Smith.

Three nuisances were removed. We have had no cases of diphtheria, scarlet fever or typhoid fever. Measles and whooping cough have been prevalent. Better drainage is needed in some portions of the village.

Wiscasset.

Members of the board: W. F. Merrill, Secretary; J. G. Somes, Chairman; Dr. B. R. Brown, member and Health Officer.

Two nuisances were removed. Two fatal cases of diphtheria occurred in one house. A system of sewerage and water works are needed.

Woodland.

Members of the board: R. W. Withee, Secretary; D. A. Snowman, Chairman; A. J. Johnson.

We have had no cases of diphtheria, scarlet fever or typhoid fever. The year has been noted for its healthfulness.

Woodstock.

Members of the board: Dr. C. B. Rankin, Secretary; Isaac Andrews, Chairman; A. L Rowe.

One nuisance was removed. Two cases of typhoid fever occurred in one house. Whooping cough has prevailed extensively. There have been more accidents than for many years before, but only one of them resulted fatally, that a gunshot wound at the base of the brain in a boy fifteen years old.

Yarmouth.

Members of the board: R. Harding, Secretary; Dr. W. W. Thomas, Chairman; Charles T. Grant.

We have laid 1,175 linear feet of fifteen inch vitrified stone drain pipe on Main street. This empties into Mr. George W. Hammond's sewer pipe starting from Main street and running into Royal river. Seven nuisances were abated.

Diphtheria, eight cases, five deaths, two houses; scarlet fever, two cases, no deaths, one house; typhoid fever, four cases, two deaths, three houses. On receipt of a notice from the attending physician I have immediately visited the house, inspected the premises, and carried out the instructions of the State Board of Health as set forth in their blanks and circulars.

York.

Members of the board: Dr. W. L. Hawkes, Secretary and Health Officer; G. W. S. Putnam, Chairman; Frank Ellis.

Five artesian wells have been drilled for water supply. Four nuisances were removed. We have had no cases of diphtheria, scarlet fever or typhoid fever, but one case of typhoid pneumonia occurred.

Orders and By-Laws of Local Boards of Health, or Extracts from Them.

Portland.

Orders of the board of health of the city of Portland, Maine. Approved by William Wirt Virgin, one of the justices of the Supreme Judicial Court.

1. On and after the first day of June, 1887, no person shall be allowed to construct any privy vault, cess-pool, or any other receptacle or conductor for drainage, for filth of any kind, within any locality within the city limits, where access can be had for drainage to a public sewer. When, upon proper complaint made in writing to the board of health, any privy vault, cess-pool, receptacle or conductor constructed and maintained prior to the adoption of these orders, shall, after careful and thorough investigation, be adjudged by the board of health to constitute a nuisance or a source of danger to the public health, such privy vault, cess-pool, receptacle or conductor, shall forthwith be discontinued and abolished, when the premises upon which said nuisance exists can be connected with a public sewer.

When such nuisances exist in localities unprovided with proper street sewers, such disposition shall be made of them as the board of health may determine.

2. Whenever any reasonable complaint is made regarding the keeping of any swine within the city limits, the Inspector shall order said swine to be removed.

3. Any accumulation of refuse matter, such as swill, waste of meat, fish or shells, bones, decayed vegetables, dead carcasses, excrement, or any kind of offal which may decompose and generate disease germs or unhealthy gases, and thus affect the purity of the air in the immediate vicinity of any dwelling house or place of business, shall be considered a nuisance, and must be removed or

disposed of either by burial, burning or otherwise, and in such manner that it may not be offensive to the neighborhood wherever located.

4. No diseased animal or its flesh, and no decayed meat, fish, vegetables or fruit, or impure or adulterated milk nor any impure or adulterated articles used as food, shall be sold or offered for sale as food.

Chapter 123, Public Laws of 1887.

SECT. 26. Any person who shall willfully violate any of the provisions of this act or of said regulations and by-laws the penalty for which is not herein specifically provided for—and any person who shall willfully interfere with any person or thing to prevent the execution of the provisions of this act or of said regulations and by-laws, shall be guilty of a misdemeanor; and upon conviction thereof shall be subject to a fine not more than fifty dollars.

Adopted May 20, 1887.

Order of the board of Health of the City of Portland, Me. Adopted Sept. 25th, 1890. Approved by Wm. Wirt Virgin, Justice of the Supreme Court, October 3, 1890.

All shops, stores or buildings used, occupied or let for the purpose of manufacture or trade, shall be furnished with suitable and sufficient water closets and urinals, which in respect to their construction and supply of water shall be satisfactory to the board of health; and any person or persons who shall use, occupy or let any building or tenement in which trade or manufactures are carried on, and shall not furnish the same with suitable and sufficient water closets and urinals satisfactory to the board of health, shall be subject to a penalty of five dollars for each offense, and five dollars additional for each month that the offense shall be allowed to continue.

AUBURN.

Be it ordained by the mayor, aldermen and common council of the city of Auburn, as follows:

That Chapter VIII, of the Revised Ordinances be amended by adding thereto the following section, viz:

SECT. 14. Wherever there is an adequate public sewer or drain built or maintained by the city of Auburn in any of the streets, alleys or lanes thereof, if the Board of Health, or a majority

thereof, shall be of opinion and shall so adjudge that the waste water, slops and human excreta upon, and incident to the use of, any building or buildings or premises, on lots contiguous to any of said streets, alleys or lanes in which is any such sewer or drain, but not connected with such sewer or drain through proper and authorized plumbing, are offensive to sight or smell, or dangerous to life or health, the owner or owners of such house or premises shall forthwith connect said house or premises with said sewer—and shall thereafter drain all wash water, waste water, slops and human excreta from said building or premises into said sewer. And any such owner or owners, who after thirty days notice in writing from the Board of Health, that said waste water, slops and human excreta are offensive to sight or smell, or are dangerous to life or health, and that he or they must forthwith connect said house or premises with said sewer or drain, shall fail or neglect to make such connection in a manner satisfactory to the Board of Health; or if such connection has been made shall thereafter fail or neglect after such notice to cause all wash water, waste water, slops and human excreta to be drained from said building or premises into and through said sewer, shall forfeit and pay for each week's failure or neglect, not exceeding twenty dollars to be recovered in an action of debt for the use of the city.

PLUMBING AND HOUSE DRAINAGE

1. Before proceeding to construct any portion of the drainage system of a building, the owner, builder or person constructing the same shall file with the board of health a plan thereof showing the whole drainage system, from its connection with the common sewer to its terminus in the house, together with the location and sizes of all branches, traps, ventilating pipes and fixtures, and no such work shall be done in any building without the approval of said board of health.

2. All soil pipes shall be carried at their full size, at least two feet above the roof and left open.

3. All drains now built shall be reconstructed, whenever in the opinion of the board of health it may be necessary.

DEERING.

Orders of the Board of Health of the town of Deering, Maine. Adopted May 26th, 1890.

1. No sink, bath tub, water closet, privy, cess-pool or place of accumulation of offensive liquid matter, shall be allowed to drain into any lane, street or highway.

3. No night soil, sewage, contents of privy vaults or cess-pools, or other noisome substance, shall be deposited in any place, or used as manure or fertilizer in such way or manner, as shall be detrimental to life or health, or offensive to the neighborhood wherever located.

4. Whenever a privy vault shall have been removed by order of the board of health, or otherwise, the premises shall be supplied with suitable water closet which, in respect to its water flush, shall be satisfactory to the board of health.

EDDINGTON.

SECT. 1. A public funeral shall not be held for any person who has died of scarlet fever, diphtheria, small-pox, cholera or typhus fever; and the body of any person who has died of any of these diseases, shall neither be brought within nor carried without the jurisdiction of this board without permission in writing from the board, nor shall there be a disinterment of any such body after it has once been buried, without the written permission of the board.

SECT. 2. No dead animal shall, within the jurisdiction of this board, be put into any river, well, spring, cistern, reservoir, stream or pond; nor shall any live animal be put into any river, well, spring, cistern, reservoir, stream or pond for the purpose of drowning and allowed to remain in said waters; nor shall any dead animal be allowed to decay upon the surface of the earth within the jurisdiction of this board.

MASON.

By-laws of the town of Mason relating to public health. Adopted June 20th, 1887.

RULE 5. No privy shall be located so as to affect the purity of any well or spring of water used for drinking or cooking purposes, and all privies shall be cleaned out at least twice each year, on, or before the first day of June and the first day of November.

RULE 6. All sinks shall be so drained as not to endanger the purity of any well or spring of water, and no sink drain shall leave its deposit sufficiently near any dwelling as to make the air unhealthy.

RULE 7. All cellars must be properly cleaned once each year, on or before the first day of June, of all decaying vegetables or impure collections.

NORTHPORT.

Rules and regulations of the local board of health of Northport. Adopted August 4, 1887.

The frequent throwing out of dirty water or other liquids in any place so as to cause an offensive condition of the premises, or the collection of refuse matter in or around the immediate vicinity of any dwelling house, cottage, tent, or place of business, such as swill, waste of meat, fish or shells, bones, decaying vegetables, dead carcasses, excrement, or any kind of offal that may decompose and generate disease germs or unhealthy gases, and thus affect the purity of the air or contaminate the water of any well, shall be considered nuisances of the worst kind and must be discontinued and the offensive substances removed, or disposed of by burial, burning or otherwise, and in such manner as not to be offensive to the neighborhood wherever located.

Copies of the orders or by-laws adopted by many other local boards of health in this State have been received, but they are based on the model by-laws suggested by the State Board, are duplications of some of the foregoing, or our later State legislation has rendered them needless.

ASBURY PARK, N. J.

Sanitary code of the borough of Asbury Park, N. J. Adopted March 22, 1887.

SECT. 6. Every physician shall report to this board, in writing, the name, age and address of every person having scarlet fever, diphtheria, membraneous croup, dysentery, measles, small-pox, varioloid, cholera, typhoid fever, typhus fever, yellow fever or any other contagious or infectious or communicable disease, publicly declared by this Board to be dangerous to the public health, whom such physician shall have professionally attended or prescribed for; said report to be made within twelve hours after such physician has first professionally attended such sick person. Said reports shall

be written on blank forms provided by this Board, and said reports shall be furnished subject to the provisions of section 14 of the rules and regulations of this Board. Any person or persons offending against any of the provisions of this section shall forfeit and pay a penalty of one hundred dollars.

SECT. 7 Every physician shall report in writing the name, age, and address of any person who shall have died of any of the diseases mentioned or referred to in the foregoing section, within three hours after he shall have been informed of said death, and such report shall be independent of the regular certificate of death required by law. Any person or persons offending against any of the provisions or this section shall forfeit and pay a penalty of twenty-five dollars.

SECT. 8 No principal, teacher or superintendent of any school, and no parent or guardian of any child attending any school, shall permit any child sick with any disease mentioned in Section 6, or with any other communicable disease, or any child residing in any house in which such disease shall exist, to attend any school until this Board shall have given its permit therefor. Any person or persons offending against any of the provisions of this section shall forfeit and pay a fine of twenty dollars.

SECT. 9. Whenever it shall be deemed necessary by this board to establish the true character of any disease which they may believe to be communicable, a medical examination of the person or persons affected by such disease may be ordered, and such examination shall be permitted by all attendants and persons. Any person or persons offending against any of the provisions of this section shall forfeit and pay a penalty of fifty dollars.

SECT. 10. In case infectious or contagious or communicable disease occurs in this borough, the person affected thereby shall at the discretion of this Board, be isolated or they may be removed to such locality as this Board may order and direct; and all buildings, clothing, property and premises and vehicles which may become infected by the presence of persons affected by contagious, infectious or communicable disease shall be disinfected at the expense of the tenant, occupant or owner thereof, and said disinfection or fumigation shall be made and performed in such manner and with such materials and within such stated time and under such supervision as this Board may direct. And this Board may establish such separation and isolation or quarantine of the sick from other

persons not necessary as attendants, and also provide and effect such special care, disinfection and cleansing of property and premises as shall, in the judgment of the Board, be needed in order to prevent the spreading of such diseases to other persons Any person or persons offending against any of the provisions of this section shall forfeit and pay a penalty of fifty dollars.

SECT. 11. Whenever quarantine or isolation and separation of persons or property is ordered by this Board, notice of said order shall be given to the persons affected thereby. Said notice shall be in writing and it may be served personally, or it may be posted upon the building or premises occupied by the infected persons or property. The requirements of said quarantine notices shall be obeyed by all persons, and no such notice nor any other sign indicating the presence of communicable disease upon any premises shall be removed except by consent of this Board. Any person or persons offending against any of the provisions of this section shall forfeit and pay a penalty of one hundred dollars.

SECT. 12. No person or article liable to propagate a communicable disease shall be brought within or removed from the limits of the borough of Asbury Park without the written permit and under the direction of the board of health thereof; and whenever it shall come to the knowledge of any person that such person or article has been brought within such limits, he shall immediately give notice thereof to the said board. No person shall, within the borough of Asbury Park, without a permit from the board of health therefor, carry or remove from one building to any other, any person sick of any communicable disease, nor shall any person by any exposure of any individual sick of any communicable disease, or of the body of such person, or by any negligent act connected therewith, or in respect to the care or custody thereof, or by a needless exposure of himself, cause or contribute to, or promote the spread of any communicable disease. Any owner, lessee or tenant of any dwelling in which there shall occur a case of communicable disease, shall immediately notify the board of health of the same, and until instructions are received from the said board, shall not permit any clothing or other property that may have been exposed to infection to be removed from the house. Nor shall any occupant of such a house change his residence elsewhere without the consent of the said board during the prevalence of any public danger from said disease; and all attendants upon any person sick with small-pox,

typhus, typhoid or scarlet fever, diphtheria, cholera or other disease dangerous to the public health, shall forthwith report the same to the board of health Any person or persons offending against any of the provisions of this section shall forfeit and pay a penalty of fifty dollars.

SECT. 13. That when death has been caused by communicable disease, no dead body of any human being shall remain unburied for a longer time than twenty-four hours without a permit from this board. When death has been caused by communicable disease the body shall be immediately thereafter disinfected in such manner as may be directed by this board, and inclosed in an air-tight coffin, which shall not thereafter be opened, and the funeral of such persons shall be strictly private, and in the removal thereof for burial or otherwise hearses only shall be employed. Any person or persons offending against any of the provisions of this section shall forfeit and pay a penalty of fifty dollars.

SECT. 14. Every person having authority to solemnize marriages, shall transmit to the board of health of this borough, a certificate of every marriage solemnized before him, within ten days next thereafter, and said certificate shall be made out on the blank forms furnished by this board for that purpose, and shall include all facts required by said forms. Any person or persons violating the provisions of this section shall forfeit and pay a penalty of twenty-five dollars.

SECT. 15. It shall be the duty of the physician or midwife present at the birth of every child born in this borough, and in case there is no physician or midwife present, it shall be the duty of the parent or witness present at such birth, to report in writing to the board of health of this borough, all particulars concerning said birth and called for on the blank forms furnished by this board for that purpose, and said report shall be made within ten days next after the date of said birth. Any person or persons offending against any of the provisions of this section shall forfeit and pay a penalty of twenty-five dollars.

SECT. 16. No undertaker or other person shall bury in, or bring into, or remove from this borough the dead body of any person without first having received from the board of health of this borough a permit to do so; said permit shall be granted only upon presenting to the said board the certificate of death, which shall be in accordance with the requirements of the following section, or

which shall be given by one of the coroners of the county of Monmouth. Any person or persons offending against any of the provisions of this section shall forfeit and pay a penalty of twenty-five dollars.

SECT. 17. That in the case of any person dying within this borough, it shall be the duty of the physician who may have attended during the last illness, to furnish the undertaker or any member of the family a certificate of death, which certificate shall be made out on and shall comprise all the facts stated in the blank forms furnished for that purpose by this board. Any person or persons offending against any of the provisions of this section shall forfeit and pay a penalty of twenty-five dollars.

SECT. 39. No person shall slaughter any swine, sheep or goats, nor any cattle within the limits of this borough until a permit therefor is first obtained from this board. Any person or persons offending against any of the provisions of this section shall forfeit and pay a penalty of ten dollars.

SECT. 40. No animal affected with an infectious or contagious disease shall be brought or kept within the limits of this borough, except by the written permission of the board of health. Any person or persons offending against any of the provisions of this section shall forfeit and pay a penalty of fifty dollars.

SECT. 41. No person shall allow any cattle, swine, goats or fowls to run at large in the borough; and no person shall keep or permit to be kept any swine, cows, goats or fowls without a permit to do so from this board. Any person or persons offending against any of the provisions of this section shall forfeit and pay a penalty of twenty dollars.

SECT. 46. No person shall let or occupy, or suffer to be occupied separately as a tenement, any cellar or underground room whatsoever, unless the same be in every part thereof at least seven feet in height, measured from the floor to the ceiling thereof, nor unless the same be for at least three feet of its height above the surface of the street or ground adjoining or nearest to the same, nor unless there is a clear space of not less than one foot below the level of the floor, except where the same is cemented, nor unless the same have at least one external window opening of not less than nine superficial feet for every one thousand cubic feet of space, in which window opening there shall be fitted a frame filled in with glazed sashes, at least four and a half superficial feet of which shall be made so as

to open for the purpose of ventilation. Any person or persons offending against any of the provisions of this section shall forfeit and pay a penalty of fifty dollars.

SECT. 47. Every tenement house, and every part thereof, shall be kept clean and free from any accumulation of dirt, filth, garbage or other matter in or on the same, or in the yard, passage, area or alley connected with or b elonging to the same. The owner or lessee of any tenement house, or part thereof, shall thoroughly cleanse all the rooms passages, stairs, floors, windows, doors, walls, ceilings, privies, cess-pools, and drains thereof, of the house or part of the house of which he is the owner or lessee, to the satisfaction of this board, as often as shall be required by said board, once at least in every year. Any person or persons offending against any of the provisions of this section shall forfeit and pay a penalty of twenty-five dollars

HAVERHILL, MASS.

Regulations of the board of health for the construction of house drainage. 1887.

SECT. 1. On every street provided with a common sewer the sewerage from each building shall be conducted into the common sewer, and no privy vault or cess-pool will be permitted upon any premises situated on such street, unless upon permission of the board of health in writing All buildings located on such streets must be provided with water-closets either in the house or yard.

SECT. 2. Before proceeding to construct or re-construct any portion of the drainage system of any building, the contractor or plumber having charge of the same shall, except in the case of leaks, file with the board of health plans and specifications of the whole drainage system, including branches, ventilating pipes, traps, etc., and in case of a privy vault, a description thereof, giving its position relative to the house and limits of the lot, its size, construction and ventilation; and no person shall commence any portion of such work until the description thereof shall have been approved by the board of health, and after such inspection there shall be no alterations unless likewise approved. Blank specifications will be furnished to architects, plumbers and others on application at the office of the board of health.

SECT. 3. The agent of the board of health shall be promptly notified in writing, and upon blank forms to be provided for that

purpose, when the plumbing work on any house is completed or sufficiently advanced for inspection. He shall proceed at once to pass upon the work, and all inspections shall be made promptly, not later than twenty-four hours after such notification. No part of the plumbing work of any house shall be covered, or in any manner hidden from view, until after such inspection has been made and certificate of approval issued by the board of health. The agent shall promptly condemn and order removal of any defective material, or of any work done other than in accordance with the provisions of these regulations.

SECT. 4. When required by the agent of the board of health, all plumbing shall be tested with the peppermint or water test by the plumber, in the presence of the agent, and all defective joints made tight, and other openings made impermeable to gases Defective pipe discovered shall be removed and replaced by sound pipe.

SECT. 5. *Materials.* Every soil, drain, waste or ventilating pipe above ground and inside or under the building, shall be of metal. Soil-pipes shall be of iron, sound, free from sandholes, of a uniform thickness, and of not less than four inches in diameter; and waste-pipes shall be of iron or lead. The portion of the main drain within the house-walls, and through and to two feet outside of the cellar-wall, shall be of iron, and shall pass through the walls two inches clear of the masonry on the top and both sides to avoid injury by settlement. Beyond this point it shall be of extra heavy iron pipe or vitrified earthen pipe of suitable size, with a fall of at least one-quarter inch to the foot.

SECT. 6. *Joints.* Joints in iron pipe shall be either screw, oakum-packed and lead-calked, or carefully and properly made rust joints; and joints of lead pipe shall be, where practicable and possible, of wiped solder. Joints in cement or earthen pipe shall be made water tight by means of hydraulic cement-mortar, and care must be taken that no mortar is left at the joint inside the pipe; and joints of lead with iron pipe shall be made with a brass sleeve or ferrule joined with the lead pipe with a wiped solder joint and calked with lead in the iron hub.

SECT. 7. *Connections.* Connections of branch wastes with the main drain, soil or other waste pipes shall be made so as to change the direction of the flow as smoothly as possible, and when cast fittings are used, connections shall be made by means of Y branches and 1-8 bends, except on vertical waste or soil stacks.

SECT. 8. *Water-Closets.* No water-closet shall be set up in any room or apartment that has not a window having an area of at least three square feet opening directly to the external air; they will, however, be permitted in rooms or apartments having no windows communicating directly with the external air, providing that there is a duct to the open air through a heated flue with an opening under, or near the seat of the water-closet for taking air; and such air-ducts shall enter the flue above all openings for stoves. All water-closets shall be furnished with a sufficient supply of water to keep them at all times clean and well flushed, and shall, unless otherwise permitted by the board of health, be supplied from a special tank, which shall not hold less than five gallons of water for each water-closet which it supplies.

SECT. 9. *Traps and Fresh Air Inlet.* Each fixture shall have an effectual trap close to it—the distance not to exceed two feet—and which, if of a kind and in a position liable to be syphoned or affected by back pressure, shall be protected therefrom by a special air pipe, in no case less than two inches in diameter for water-closet traps, and one inch and a quarter for other traps. As exception, the use of a single trap may be permitted for one set of wash trays or two adjoining fixtures, consisting of wash-bowls or bath-tubs. In no case shall the waste pipe from a bath-tub or other fixture be connected with a water-closet trap: nor shall traps be placed on or at the foot of vertical soil-pipes. A running or 1-2 S trap shall be placed on the house-drain at an accessible point, either outside or inside of the foundation wall of the building. This trap must be furnished with a hand hole for convenience in cleaning, the cover of which must be properly fitted and made gas and air tight. There shall be an inlet for fresh air entering the drain just inside this trap, of at least four inches in diameter, leading to the outer air.

SECT. 10. *Safes, Overflows, Refrigerators.* Waste-pipes from safes and refrigerators and overflow tanks or cisterns, shall empty over sink, trapped gully or otherwise, as may be approved, but shall not connect directly with the drainage system.

SECT. 11. *Conductors.* Rain-water leaders shall not be used as soil, waste or vent pipes, nor shall any soil, waste or vent pipe be used as a leader. When within the house, the rain-leader must be of cast-iron, with leaded joints; when outside of the house and connected with the house-drain or common sewer, it must be trapped

beneath the ground, or just inside the wall, the trap being arranged in either case so as to prevent freezing. In every case where a leader opens near a window or a light-shaft, it must be properly trapped at its base.

SECT. 12. *Ventilation*. Soil-pipes shall be continued full bore, up through the roof without return bend, in as direct a line as possible, terminating at least two feet above any window or opening into the building. All branches of ten feet or more in length shall be continued at full size through the roof, or be taken into the soil-pipe above the highest fixture, unless otherwise permitted. Any branch less than four inches in diameter, to be carried through the roof, shall, four feet before passing through, be enlarged to not less than four inches and terminate not less than two feet above the roof, and remote from windows or other openings into the building. Ventilation pipes shall be of not less than two inches in diameter for distances of thirty feet or less, and of not less than three inches for distances of more than thirty feet.

SECT. 13. *Arrangement*. Soil, drain, waste and ventilating pipes shall be concentrated as much as possible, and, on the completion of the work, shall be left readily accessible, and in view as much as possible. Drain, soil, waste and ventilating pipes and the traps, should be exposed to view for ready inspection at all times, and for convenience in repairing. When necessarily placed within partitions or recesses in walls, soil and waste pipes shall be covered with wood work so fastened with screws as to be readily removed. In no case shall they be absolutely inaccessible. Any house-drain put in and covered over without due notice to the board of health, must be uncovered for inspection at the direction of its agent or inspector.

SECT. 14. *Workmanship*. The whole drainage and plumbing work of buildings shall be executed by skilled mechanics in a thorough and workmanlike manner.

SECT. 15. *Privy Vaults*. Privy vaults shall be built of smooth, hard-burned bricks, laid with hydraulic cement-mortar, and with walls of solid masonry eight inches thick. The whole interior surface shall be coated with cement-mortar, and shall be ventilated in such a manner as not to annoy occupants of neighboring buildings.

SECT. 16. *Privies*. No privy shall open directly from any living or food-storage room.

SECT. 17. *Ventilation*. No brick, sheet-metal or earthen ware flue shall be used inside of any building to ventilate any privy

vault, cess-pool, trap, drain, waste, or soil-pipe, and chimney flues shall not be used as such ventilators.

SECT. 18. *Cess-pools.* Cess-pools shall be built in a thorough and substantial manner, and shall be properly ventilated. Should the cess-pool be located within twenty feet from the foundation wall of the cellar, or fifty feet from a well or other source of water-supply which is used for culinary purposes, it shall be made absolutely water tight.

SECT. 19. No opening shall be provided in the sewer-pipe of any building for the purpose of receiving the surface drainage of the cellar, unless special permission is granted by the board of health, and any opening so made shall be immediately and permanently closed when directed by the board of health. Cellar and foundation walls must when possible, be rendered impervious to dampness, and the use of asphaltum or coal tar pitch, in addition to hydraulic cement, is recommended for that purpose.

SECT 20. Subsoil drains shall be provided whenever dampness of site is known to exist. When used they must be effectually trapped and means provided to maintain a seal.

SECT. 21. All drains now built shall be re-constructed whenever in the opinion of the board of health, it may be necessary.

SECT. 22. The provisions of sections 4 to 13, inclusive, of these regulations shall apply only to buildings erected, and to work performed after their passage.

CLEVELAND, OHIO.

Regulations of the city of Cleveland, Ohio, for the construction of plumbing and house drainage.

SECTION 1. Be it ordained by the city council of the city of Cleveland, that no part of the work in plumbing or house drainage shall be covered or concealed in any way until after it has been examined by the inspector of the board of health, and notice must be sent to the office of the board of health when the work is sufficiently advanced for inspection, and when the plumbing work is finished notice must be given at the office of the board of health, within two days, that the work is ready for inspection. No inspections will be made on legal holidays

SECT. 2. All plumbing and house drainage must be constructed in accordance with the following rules:

RULE 1. All materials must be of good quality and free from defects; the work must be executed in a thorough and workmanlike manner.

RULE 2. The arrangement of soil and waste pipes must be as direct as possible.

RULE 3. The drain, soil and waste pipes and the traps must if practicable, be exposed to view for ready inspection at all times and for convenience in repairing. When necessarily placed within partitions or in recesses of walls, soil and waste pipes should be covered with wood work so fastened with screws as to be readily removed. In no case shall they be absolutely inaccessible.

RULE 4. It is recommended to place soil and other vertical pipes in a special shaft between or adjacent to the water-closets and bath room and serving as a ventilating shaft for them. This shaft should be at least two and one-half feet square. It should extend from the cellar through the roof and should be covered by a "louvered skylight." It should be accessible to every story and should have a very open but strong grating at each floor to stand upon. Shafts not less than three feet square in area are required in tenement houses to ventilate interior water-closets.

RULE 5. Every house or building must be separately and independently connected with the street sewer.

RULE 6. All house sewers must be of iron or hard salt glazed and cylindrical earthen-ware pipe, laid on a smooth bottom, free from all projections of rock, and with soil well rammed to prevent settling of the pipe. Each section must be wetted before applying the cement, and the space between each hub and the small end of the next section must be completely and uniformly filled with the best hydraulic cement. Care must be taken to prevent any cement being forced into the drain to become an obstruction. No tempered up cement shall be used A straight edge must be used inside the pipe, and the different sections must be laid in perfect line on the bottom and sides.

RULE 7. When water closets discharge into it, the drain must be at least six inches in diameter.

RULE 8. It must be laid in a straight line if possible, and all changes in direction must be made with curved pipes, and all connections with "Y" branch pipes and one-eighth bends

RULE 9. Any house drain or house sewer put in and covered without due notice to the health department must be uncovered for inspection at the direction of the inspector.

RULE 10. A running or half-S trap must be placed on the house drain at an accessible point near the front of the house. This trap must be furnished with a hand hole, for convenience in cleaning, the cover of which must be properly fitted and made gas and air-tight with some proper cement.

RULE 11. No brick, sheet-metal, earthen-ware or chimney flue shall be used as a sewer ventilator, nor to ventilate any trap, drain, soil or waste-pipe.

RULE 12. Every soil and waste-pipe must be of cast iron, lap-welded wrought iron, lead, copper or brass, and where it receives the discharge of fixtures on two or more floors, or fixtures upon any floor above the first, except for water-closets, it must be extended at least two feet above the highest part of the roof or coping. All soil-pipes that receive the waste from water-closets must extend at least two feet above the highest part of the roof or coping, of undiminished size. They must not open near a window nor an air-shaft which ventilates living rooms. For small fixtures other than water-closets, located with not more than eight feet vertical fall, and connected separately to the sewer, the special air-pipe may be omitted. When two or more fixtures discharge into the same waste-pipe, the traps must be protected from syphonage as prescribed in Rules 27 and 28 in this section.

RULE 13. Soil, waste and vent-pipes in an extension must be extended above the roofs of the main building, when otherwise they would open within twenty feet of the windows of the main house or the adjoining house.

RULE 14. The minimum diameter of soil-pipe for water-closets permitted is four inches. A vertical waste-pipe, into which a line of kitchen sinks discharge, must be at least two inches in diameter with one inch and a half branches.

RULE 15 Where lead pipe is used to connect fixtures with vertical soil or waste-pipes, or to connect traps with vertical vent-pipes, it must not be lighter than the grade called "extra light."

RULE 16. There shall be no traps on vertical soil-pipes or vertical waste-pipes.

RULE 17. All cast iron pipes must be sound, free from holes and of a uniform thickness of not less than one-eighth of an inch for a diameter of two, three or four inches, or five thirty-seconds of an inch for a diameter of five or six inches; and in case the building is over sixty-five feet in height above the curb, the use of what

is known as "extra heavy" pipe and corresponding fittings is required, which weigh as follows: 2 inches, 5½ lbs. per lineal foot; 3 inches, 9½ lbs. per lineal foot; 4 inches, 13 lbs. per lineal foot; 5 inches, 17 lbs. per lineal foot; 6 inches, 20 lbs. per lineal foot; 7 inches, 27 lbs. per lineal foot; 8 inches, 33½ lbs. per lineal foot; 10 inches, 45 lbs. per lineal foot; 12 inches, 54 lbs. per lineal foot.

All wrought iron pipes must be sound and must be of what is known as standard grade pipe with corresponding fittings. All fittings for soil, waste and vent-pipes must be of cast iron; all soil, waste and vent-pipes must be supported by hooks or pipe rests not more than ten feet apart.

RULE 18. Before they are connected they must be thoroughly coated inside and outside with coal tar pitch applied hot, or some other equivalent substance.

RULE 19. All soil, waste and vent-pipes must be tested by the plumber in charge, with a water test or by an air test applied with pump and guage, as directed by inspector, in the presence of the inspector, after due notice to the health office of place and time, by a pressure of not less than twenty pounds to the square inch, after all openings have been closed by the plumber or person in charge of the work. Pipe, joints, fittings or fixtures thus shown to be defective or wrongly placed, must be made good or be replaced within five days and again tested if so required by the inspector. None of the said pipe shall be covered from sight till they have been shown to stand the test prescribed, to the satisfaction of the inspector. After the plumbing work of a building has been tested as directed, no alterations will be permitted except upon written application of the owner or plumber in charge of the work.

RULE 20. All joints in the iron drain-pipes, soil-pipes, and waste-pipes must be so calked with oakum and lead, or with cement made of iron filings and sal ammonia, so as to make them impermeable to gas.

RULE 21. All connections of lead with iron pipes must be made with brass sleeve or ferrule, of the same size as the lead of the pipe, put in the hub of the branch of the iron pipe and calked in with lead. The lead pipe must be attached to the ferrule by a wiped joint.

RULE 22. All connections of lead pipe should be by wiped joints.

RULE 23. Every water-closet, urinal, sink, basin, wash-tray, bath, and every tub or set of tubs, must be separately and effec-

tively trapped, except where a sink and wash-tub immediately join each other, in which case the waste-pipe from the tubs may be connected with the inlet side of the sink trap; in such a case the tub waste-pipe is not required to be separately trapped.

RULE 24. Traps must be placed as near the fixtures as practicable and in no case shall a trap be more than two feet from the fixtures

RULE 25. All soil-pipes must be provided with strong metallic strainers.

RULE 26. In no case shall the waste from a bath-tub or other fixtures be connected with a water-closet trap.

RULE 27. Traps must be protected from syphonage, and the waste-pipe leading from them ventilated by a special air-pipe; in no case less than two inches in diameter for water-closet traps and one and a half inch for other traps, and ventilation pipes less than four inches in diameter must not be carried up outside the building. In buildings more than four stories in height, the vertical vent-pipes for water-closets must be at least three inches in diameter with a two inch branch for each trap, and for traps of other fixtures not less than two inches in diameter, with branches one and a half inches in diameter, unless the trap is smaller, in which case the diameter of branch vent-pipe must be at least equal to the diameter of the trap. In all cases vertical vent-pipes must be of cast or wrought iron gas pipe.

RULE 28. These pipes must either extend two feet above the highest part of the roof or coping, the extension to be not less than four inches in diameter, to avoid obstruction from frost, or they may be branched into a soil-pipe not less than six feet above the highest fixture. They may be combined by branching together those which serve several traps. These air-pipes must always have a continuous slope to avoid collecting water by condensation.

RULE 29. No trap vent-pipe shall be used as a waste or soil-pipe.

RULE 30. Overflow pipes from fixtures must in each case be connected on the inlet side of the trap.

RULE 31. Every safe under a wash-basin, bath, urinal, water-closet, or other fixtures, must be drained by a special pipe not directly connected with any soil-pipe, water-pipe, drain or sewer, but discharging into an open sink upon the cellar floor or outside the house.

RULE 32. The waste-pipe from a refrigerator shall not be directly connected with the soil or waste-pipe, or with the drain or sewer, or discharge into the soil; it should discharge into an open sink. Such waste-pipes should be so arranged as to admit of frequent flushing, and should be as short as possible and disconnected from the refrigerator.

RULE 33. The sediment pipe from kitchen boilers must be connected on the inlet side of the sink trap, if connected to waste-pipe.

RULE 34. Rain water leaders must never be used as soil, waste or vent-pipes, nor any soil. waste or vent-pipe used as a rain water leader; all rain water conductors which are carried up within the wall of a building must be of iron, as required for soil-pipes.

RULE 35. In every case where a leader opens near a window or light shaft it must be properly trapped at its base.

RULE 36. No steam exhaust or blowoff-pipe from a steam boiler will be allowed to connect with any soil or waste-pipe, or directly with any house drain. They should discharge into a tank or condenser, the waste from which, if to be discharged into a sewer through the house drain, must be connected on the sewer side of the running trap.

RULE 37. No privy vault, school sink or sewer-pipe closet will be permitted in any cellar or basement, and all sewer-pipe closets must be located at least ten feet from any building occupied as a dwelling house, nor shall the general privy accommodations of a tenement or lodging house be allowed in the cellar or basement, unless properly constructed water-closets are used.

RULE 38. No privy vault or cess-pool for sewerage will be permitted in any part of the city where water-closets or a school sink can be connected with a public sewer in the street.

SECT. 3. Any person or persons violating any of the provisions of this ordinance shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be subject to a fine of not less than ten dollars or more than five hundred dollars, or imprisonment not exceeding thirty days or both, in the discretion of the court imposing the same.

PRACTICAL

SANITARY & ECONOMIC COOKING

ADAPTED TO

Persons of Moderate and Small Means.

BY

MRS. MARY HINMAN ABEL.

THE LOMB PRIZE ESSAY.

Inscription: "The Five Food Principles, Illustrated by Practical Recipes."

PREFACE.

Perhaps there is no better way of presenting to the public the facts which led to the creation of this valuable work, than by inserting the announcement which resulted in the exceedingly lively and able competition for the prize, as well as the merited honor which was certain to fall upon the successful competitor. It read as follows:

AMERICAN PUBLIC HEALTH ASSOCIATION.

THE LOMB PRIZE ESSAYS.

Two Prizes for 1888.

Mr. Henry Lomb, of Rochester, N. Y., now well known to the American public as the originator of the "Lomb Prize Essays," offers, through the American Public Health Association, two prizes for the current year, on the following subject:

PRACTICAL SANITARY AND ECONOMIC COOKING ADAPTED TO PERSONS OF MODERATE AND SMALL MEANS.

First Prize, $500, - - - Second Prize, $200.

JUDGES: Prof. Charles A. Lindsley, New Haven, Conn.; Prof. George H. Rohé, Baltimore, Md.; Prof. Victor C. Vaughan, Ann Arbor, Mich.; Mrs. Ellen H. Richards, Boston, Mass.; Miss Emma C. G. Polson, New Haven, Conn

CONDITION: The arrangement of the essay will be left to the discretion of the author. They are, however, expected to cover, in the broadest and most specific manner, methods of cooking as well as carefully prepared receipts, for three classes,—(1) those of moderate means; (2) those of small means; (3) those who may be

called poor. For each of these classes, receipts for three meals a day for several days in succession should be given, each meal to meet the requirements of the body, and to vary as much as possible from day to day. Formulas for at least twelve dinners, to be carried to the place of work, and mostly eaten cold, to be given. Healthfulness, practical arrangement, low cost, and palatableness should be combined considerations. The object of this work is for the information of the housewife, to whose requirements the average cook-book is ill adapted, as well as to bring to her attention healthful and economic methods and receipts.

All essays written for the above prizes must be in the hands of the Secretary, Dr. Irving A. Watson, Concord, N. H., on or before September 15, 1888. Each essay must bear a motto, and have accompanying it a securely sealed envelope containing the author's name and address, with the same motto upon the outside of the envelope.

After the prize essays have been determined upon, the envelopes bearing the mottoes corresponding to the prize essays will be opened, and the awards made to the persons whose names are found within them. The remaining envelopes, unless the corresponding essays are reclaimed by authors or their representatives within thirty days after publication of the awards, will be destroyed, unopened by the Secretary.

None of the judges will be allowed to compete for a prize.

The judges will announce the awards at the Annual meeting of the American Public Health Association, 1888.

It is intended that the above essays shall be essentially American in their character and application, and this will be considered by the judges as an especial merit.

Competition is open to authors of any nationality, but all the papers must be in the English language.

IRVING A. WATSON,
Secretary.

CONCORD, N. H., February, 1888.

The above circular was extensively circulated and published throughout the United States and the Dominion of Canada, with the result of bringing to the Secretary, within the specified time, *seventy essays* upon the subject announced. The arrival of these essays covered a period of nearly five months, and they were forwarded to the chairman of the Committee of Award nearly as fast

as received, thus giving the committee ample time for their exceedingly laborious work of examination. The decision of the judges was announced at the Sixteenth Annual Meeting of the American Public Health Association, and was as follows:

REPORT OF COMMITTEE ON THE LOMB PRIZES.

Your committee, to whom were referred the essays upon "Practical Sanitary and Economic Cooking Adapted for persons of Moderate and Small Means," respectfully report that they have perused with thoughtful and considerate attention the three score and ten essays which were submitted to them.

A few of them were presented in beautiful specimens of type-writing, but the great majority of them were in manuscript, and some of them not in the most legible characters, a circumstance which, it will be appreciated, became an important matter, when considered in connection with the large number of competitors, and the fact that many of their papers were each of several hundred pages in length.

The result of the labors of the committee is, that by unanimous approval, the first prize of $500 is awarded to the author of the essay bearing this inscription,—"The Five Food Principles, illustrated by Practical Recipes."

Your committee would further report that although there were among the remaining sixty-nine a number of essays of considerable merit, there was no single one so prominently superior to others as to commend the approval of the majority of your committee, nor was there any which did not contain some errors of statement, which your committee did not feel justified in endorsing with the approval of this Association by the bestowal of a prize, or else which did not fail to meet some of the conditions upon which the prize was offered, or which was not otherwise objectionable because of literary defects.

Your committee would therefore respectfully report that no essay was found among those submitted to them which they judged deserving of the second prize of $200.

The committee consider it a duty, in awarding the prize, to emphasize the fact that of all the essays submitted the one selected is not only preëminently the best, but that it is also intrinsically an admirable treatise on the subject.

It is simple and lucid in statement, methodical in arrangement, and well adapted to the practical wants of the classes to which it is addressed. Whoever may read it can have confidence in the soundness of its teachings, and cannot fail to be instructed in the art of cooking by its plain precepts, founded as they are upon the correct application of the scientific principles of chemistry and physiology to the proper preparation of food for man.

All of which is respectfully submitted.

C. A. LINDSLEY,
GEORGE H. ROHE,
V. C. VAUGHAN,
ELLEN H. RICHARDS,
EMMA C. G. POLSON.

The American public is to be congratulated upon this useful and valuable contribution to the needs of its great army of working people, made possible through the humanitarian benevolence of a private citizen. This was the fifth prize offered by the same citizen, through the same channel, for the noble purpose of ameliorating, in some degree, the hardships which befall mankind in the tireless struggle for existence.

That this essay may be placed in the hands of every family in the country, is his earnest desire as well as that of the Association; therefore a price barely covering the cost has been placed upon this volume. It is to be hoped, that Government departments, state and local boards of health, sanitary and benevolent associations, manufacturers, employers, etc., will purchase editions at cost, or otherwise aid in distributing this work among the people.

Although a copyright has been placed upon these essays for legitimate protection, permission to publish under certain conditions, can be obtained by addressing the secretary.

We commend this volume to the public, believing it to be an unequaled work upon "Practical Sanitary and Economic Cooking, adapted to persons of moderate and small means."

IRVING A. WATSON,
Secretary American Public Health Association.

INTRODUCTION.

Few things are of more importance than that we should find ourselves physically and mentally equal to our day's work, but not many of us realize how largely this depends upon the food we eat.

Supposing there to be just money enough in a given family to buy the right kind and quantity of food. Now if this money is not wisely expended, or if after the food has been bought it is spoiled in the cooking, the results will be very serious for the members of that family; they will be under-nourished and they will suffer in clear-headedness, bodily strength, and in the case of children, in bodily development

Surely the right condition of the body is too important to be left to chance; the best scientific knowledge, the best practical heads should be at its service, and this is the case, indeed, to a large extent in Europe, where the food of the soldiers and of the inmates of public institutions is furnished more or less according to certain rules that have been deduced partly from observation, and partly from scientific experiment.

The application of scientific principles on these lines is not of long standing, for the investigations that have clinched them are all of comparatively recent date. At the end of the last century a beginning was made in France and in Germany in connection with philanthropic efforts to improve the food of the poor, and it was at this time that Count Rumford introduced into the soup kitchens of Munich, the soup that has been named after him. From this time on interest in the subject of foods, both for men and domestic animals, steadily increased, although experimenters were constantly coming to wrong conclusions because the sciences of Organic Chemistry and Physiology, as far as they concerned the subject, were not far enough advanced.

It was only in the early forties that the first experimental agricultural stations were established, but so rapidly have they multi-

plied that they now number more than a hundred in Europe alone; and in these and in the laboratories of the great universities, analyses have been made of most of the foods used by men and animals and also tests of the relative flesh and fat producing power of different foods and combinations of foods.

For years the results of these investigations have been applied with profit to the feeding of cattle, but it was a case of threatened wholesale starvation in England that first turned the attention of properly trained persons to a like study of the nourishment of human beings. During our Civil War the condition of the cotton spinners in Lancashire and Cheshire, England, became so serious as to make government help necessary to keep them from starving, and in 1862 and 1863 Dr. Edward Smith was commissioned to examine into the dietetic needs of the distressed operatives. In his report for 1863 are found tables of the food consumed per week by 634 families, and in spite of the difficulties standing in the way of such an investigation, the foods consumed were classified into tables showing the amounts of the different food principles taken per week by each family.

One of the great practical results following from this investigation was the determination of the minimum amount of each nutritive principle which men, women and children need, to keep them in fair health. The amount of food with which an unemployed man can fight off starvation, and the diseases temporarily incident to it, was found to be represented in 35 ounces of good bread per day, and the necessary amount of wholesome water.

Since the publication of Dr. Smith's report similar inquiries have been instituted by the scientists of other countries, and many analyses have been made of the exact amount and kinds of food eaten by various classes of laborers under the most varied conditions. Professors Voit and Pettenkofer of Munich have even accounted for every particle of food that passed through the body of a man, both while he was at work and while he was idle. They have also noted how much of his own body was consumed when he ate nothing. Finally a great number of averages have been taken and so-called "standard dietaries" constructed, by which is meant the average amount of each of the chief food principles that keep an average muscle-worker in good condition, when doing average work.

Every one will admit that it is of great importance for the farmer to know in what proportion he shall lay in hay and other food for

the winter feeding of his stock; the animals must thrive, but there must be no waste by furnishing food in the wrong quantities or proportions.

For the housewife, the food question in its relation to her family can be stated in the very same words. It is important that she should economize, but her path will be full of pitfalls if she does not understand in what true economy consists Most people with a real interest in this subject, have had at some period of their lives certain pet theories as to food. Perhaps they have been at one time convinced that most people ate too much, at another, that meat was the all strengthener, or they may have been afflicted with the vegetarian fad, and whatever their special views have been they have thought that they rested them upon facts. But surely they would never have pinned their faith to one-sided diets if they had rightly comprehended the main facts of nutrition We believe that if these facts as at present interpreted, and the world's experience in applying them, can be put at the command of the housewife, she can use them to great profit.

We have employed the term "food principles"; what do we mean by it? Everyone knows what is meant by a food, as meat or bread, and everyone knows that the food offered us by our butchers and grocers comes from the animal and vegetable kingdoms. The oxygen we breathe and the water we drink nature furnishes for us directly, so to speak, though unfortunately for many of us, and especially for young children, the former is not thought of as a food. Oxygen aside, it has been found by those who have studied the matter, that all foods contain one or more of five classes of constituents, call "nutritive ingredients" or "food principles." These five principles are:

(1) Water.
(2) Proteids.
(3) Fats.
(4) Carbohydrates.
(5) Salts or mineral constituents.

WATER.

It is important to note that our bodies when full-grown are two-thirds water, and our food contains from 1 to 94 per cent of it. Considering the scope of this essay, it must be left to take care of itself as a food.

PROTEIDS.

A class of nearly allied bodies is included under this head. The whole class is sometimes called "Albumens."

The housewife is familiar with proteids in such foods as the lean of meat, in eggs and cheese. These contain the principle in various proportions; for example,

Lean of meat has..	15-21	per ct.
Eggs in both white and yolk	12 5	"
Fresh cow's milk on an average..	3.4	"
Cheese	25-30	"
Dried codfish	30	"

Vegetables are more deficient in proteids though the grains and legumes contain much of it.

Wheat flour has	10 to 12	per ct.
Peas, beans and Lentils have	22.85 to 27.7	" "

In fresh vegetables we find only from ½ to 3 per cent, excepting green peas and beans in which the proteids reach 5 to 6.5 per cent.

FATS.

Fats are obtained from both the animal and vegetable kingdoms. Those used by us in cookery come mostly from animals, and are known to the housewife as butter, lard and tallow. Vegetable food as a rule, is very poor in fats, containing from 0 to 3 per cent. only.

Some of the cereals, like corn and oats contain from 4 to 7 per cent. of fats.

CARBOHYDRATES.

The bodies classed as "carbohydrates" are found mainly in vegetables. The housekeeper knows them as starches and sugars.

Under the starches proper are included such things as the starches of grains and seeds, Iceland moss, gums and dextrin.

Milk is one of the few animal products that has more than a very small quantity of carbohydrates. It contains on the average about 4.8 per cent. of this principle;—slightly more than of either proteids or fats.

SALTS.

The things that give hardness to our bones, like calcium phosphate, and the common salt with which we flavor our food, illustrate this class.

FUNCTIONS OF FOOD PRINCIPLES.

To know in what proportion these food principles should be represented in our diet, we must inquire into the part played by each of them in the body. The first and the last principle may be dismissed briefly. The former, water, is the great medium which floats things through the body; the latter, salts, are combined in various ways with the solids and fluids of our foods, and we shall not easily suffer from lack of them.

The other three food principles (let us call them in the following pages the three great food principles), cannot be so summarily dealt with. We might say, briefly and dogmatically, that the proteids are "flesh foods," the fats are "heat foods," the carbohydrates "work foods." To be sure, experimenters are agreed on the main points, but the different schools are still at war on the final explanations and on many details, and it has become more and more evident that we cannot portion off the work of the body in this simple style. Though each of the three great food principles can be said to have a favorite part which it plays better than any other, yet we find that like an actor of varied talents, it has more than one rôle in its repertoire.

FUNCTION OF PROTEIDS.

That this class is indispensable we have the best of proofs. It must be given us in one or another of its forms, for, even if we are not athletes, nearly one-half of our body is made up of muscle which is one-fifth proteid, and the nitrogen in this proteid can only be furnished by proteid again, since neither fats nor carbohydrates contain any of it; therefore in making up bills of fare, let us remember that growing and working proteid, yes, even idle proteid as Dr. Smith found, needs proteid, and that there is nothing in any of the other food principles that can entirely take its place.

Though we think of proteid mostly as a great body builder and restorer, it can also to some extent furnish fat when it stands in a certain relation to the fats and carbohydrates of our food, and we are assured by experimenters that it also furnishes heat and muscle energy under certain conditions.

In these last two activities, however, it is far excelled by fats and carbohydrates. We shall therefore think of it as the nitrogen-

furnisher of our tissues, and also as the grand stimulant among foods, inciting the body, as it does, to burn up more of other kinds.

Scientists, at one time, held the opinion that our muscle energy comes chiefly from proteids. This view has been abandoned, but many a working man still believes that meat is the only kind of food that is of any account; he thinks of fats and starches as quite unimportant comparatively. Now it has been proved over and over again, that we can combine meat with fats and vegetable food in such a proportion that it shall play only its main rôle, viz., that of building and restoring, while these latter furnish the heat and muscle energy needed. Proteid food is such a costly article that it will not do to put it at work which cheaper material can do even better.

FUNCTIONS OF FATS.

The fats also have more than one office in the body. They can be stored as body fat, or they can be burned and give off heat, and they may also serve as a source of muscular energy, in an indirect manner at least

FUNCTIONS OF CARBOHYDRATES.

The carbohydrate principle furnishes fat to our tissues, and is a source of heat and muscle energy, indeed the chief source of muscle energy in all ordinary diets.

FLAVORINGS.

So far we have had chiefly in mind the real working constituents of food, if we may so speak. But many things cannot be studied or classified in the above way; they must be looked at from another point of view.

Thus a pinch of pepper, a cup of coffee, a fine, juicy strawberry,—what of these? They may contain all five of the food principles, but who cares for the proteid action or corbohydrate effect of his cup of good coffee at breakfast, or what interest for us has the heating effect of the volatile oil to which the strawberry owes a part of its delicious taste?

Surely the economical housekeeper who would throw out of the list of necessaries all the things that tickle the palate, that rouse the sense of smell, that please the eye and stimulate our tired nerves, just because these things contain but little food, would make a grave mistake. She may know just what cuts of meat to buy, what

vegetables are most healthful and economical, but if she does not understand how to "make the mouth water," her labor is largely lost. Especially if she has but little money, should she pay great attention to this subject, for it is the only way to induce the body to take up plain food with relish.

The list of these spices, flavors, harmless drinks and the like, is a long one. Unfortunately, we have no comprehensive word that will include everything of the sort, from a sprig of parsley to a cup of coffee; the German calls them "Genuss-mittel"—"pleasure-giving things."

PROPORTIONS AND AMOUNTS OF FOOD PRINCIPLES.

We have brought our discussion of the three great food principles to the point where we can enquire in what proportions and amounts these should be represented in our diet.

The standard daily dietary that is most frequently cited, and which, perhaps, best represents the food consumption of the average European workman in towns, is that proposed by Prof. Voit. This dietary was made upon the basis of a large number of observed cases. It demands for a man of average size engaged in average manual labor,

Proteids*	Fats.	Carbohydrates.
118 gms.	56 gms.	500 gms.

Now it is the opinion of all competent judges, that at least one-third of this proteid should come from the animal kingdom, and this one-third, if given in the form of fresh beef, would be represented by 230 grams of butcher's meat, calculated to consist of

Bone and tendon	18 gms
Fat	21 "
Lean	191 "

When we take whole populations into account, we find that little, if any, more meat than this falls to each person per day. Thus the average consumption per day for three great cities is given as follows:

Berlin	135 gms. per cap.
New York	226 " " "
London	274 " " "

*28.34 grams.=1 oz.

Of course these averages include children, but they also include great numbers of the well-to-do, who eat much more meat than their bodies need.

We will add a few more examples of dietaries, some of which are used by the writer in making out the bills of fare given in this essay.

Proteids, gms.	Fats, gms.	Carbohydrates, gms.	
145	100	450	Proposed by Prof. Voit for a man at hard work.
120	56	500	Allowed to German soldiers in garrison.
150	150	500	Proposed by Prof. Atwater for American at hard work.
125	125	450	By the same foı American at moderate work.
100	60	400	Proposed by Prof. Voit for a woman
80	50	320	By the same for children from 7 to 15 years.

We will give an instance of how much below these figures the amount consumed sometimes falls.

Prof. Boehm found that a poor North German family, consisting of a man, wife and a child five years old, had in one week for their food:

Potatoes	41 lbs.
Rye flour	2½ "
Meat	1¾ "
Rice	½ "
Rye bread	12 "

A very little milk.

Calculating the food principles contained in these amounts, we find that the three individuals daily consumed of:

Proteids,	Fats,	Carbohydrates,
175.5 gms.	41 gms.	1251. gms.

It needs no comment to show how insufficient is this dietary in amount, and how incorrect in proportion.

We have selected Prof. Atwater's dietary for a man at moderate manual labor as the basis of our twelve bills of fare and have taken Voit's standard for women and children.

Our climate is more trying and our people work faster, and we shall do well to allow more fat and meat to our working-man than the foreign dietaries provide. If our man is to get daily one-third of his proteid in the form of animal food, this would be represented

by 8 ozs. of butcher's meat (without bone), by from 5 to 5.8 ozs. cheese, or by 8 eggs.

We believe that it is better to go a little high rather than too low with proteid food. As a rule, people who eat enough proteids, and especially enough animal food, are vigorous and have what we call "stamina," and doctors incline to the belief that such people resist disease better because their blood and tissue are less watery than in the case of people who draw their proteids almost entirely from such vegetables as potatoes. But many workingmen in America would be surprised to learn how well health and strength can be maintained on what is, after all, not such a very large amount of meat, provided the rest of the dietary contains enough vegetable proteid and fat.

PRACTICAL APPLICATIONS.

It now remains for us to see whether the economist can get practical help from the foregoing facts about the character of foods and the use that is made of them in the body.

We have seen that we cannot economize in the amount of our food beyond certain limits and yet remain healthy and strong; also that we must not greatly alter the relative proportions in which experience has shown that these foods are best combined. The true field of household economy has, then, certain prescribed limits.

Its scope lies, 1st. In furnishing a certain food principle in its cheap rather than its dear form; for example, the proteid of beef instead of that of chicken, fat of meat instead of butter. 2d. Having bought foods wisely, in cooking them in such a manner as to bring out their full nutritive value; for instance, making a roast juicy and delicious instead of dry and tasteless. 3rd. In learning how to use every scrap of food to advantage, as in soup making, and 4th, if we add to these the art of so flavoring and varying as to make simple materials relish, we have covered the whole field of the household economist, so far as the food question is concerned.

We hope she will find help in the following pages, for it will be part of our task in this essay to examine different articles of food as to their nutritive value, and to recommend such combinations and such methods of cooking as will make the utmost out of a certain sum of money. As to foods, we have in America a large range of choice; staple raw products cost less generally than they do in Europe and the laboring man here has somewhat more money

to buy with. The anxious provider, who must feed many mouths on what seems an insufficient sum, may feel assured that he can, without doubt, learn to do better than he now does. In this line we must not disdain to learn lessons wherever we can.

There is an unfortunate prejudice among us against learning of foreign countries. The American workman says indignantly that he does not want to learn how to live on "starvation wages." But the facts, viewed coolly, are just these: the inhabitants of older countries have learned some lessons that we too must soon learn whether we will or no, and to profit by these lessons before we are really obliged to, will in no way lower wages, it will simply help us to get more comfort and pleasure out of our money.

Students of economy, political and domestic, find no better school than the experience of older countries, and constantly draw lessons from their greater thrift and economy in living. Mrs. Helen Campbell found among the poor sewing women of New York, that none were skillful in cooking their scanty food excepting only the German and Swiss women. All observing travelers unanimously give this testimony,—"If our American workman knew how to make as much of his large wage as the foreigner does of his small one, he could live in luxury."

But you ask, what are the special lessons to be learned of the foreign housewife? We answer, chiefly self-denial and saving. Do not give up in despair because you have a small income and resign yourself to living meanly, in a hand to mouth fashion. Diligent study of the question and resolute abstention from luxuries will solve the problem, if it can be solved.

We indulge ourselves and our children too much in what tastes good, while all the time we know we have not money enough to buy necessaries. For instance, the consumption of sugar in America was in 1887, 56 lbs. per head, in Germany hardly more than one-third that amount. This means a larger consumption of sweetmeats than we can afford and at the same time be well fed otherwise.

We seem, in general, to spend too much money in our country on food compared with what we use in other directions; one great trouble is that we do not know how to save every scrap of food and use it again in some form. For one thing, we have yet to learn the great art of soup making,—and it seems also, of soup eating.

The American housekeeper would say to me: "This is nothing new, for years we've been hearing about soups. We don't like

soups!" I only ask, "have you tried them for a considerable length of time, so that you have become skilled in making them, and your family used to their taste?" One fact alone ought to insure for them a good trial; that at least three nations, the French, German and Italian, make daily use of them and have for generations. To take part of our food in this form is an absolute necessity if we are to do the best possible with a certain amount of money.

PRACTICAL DIFFICULTIES.

The practical difficulties in the way of improvement in household cookery are not small. As cook, we have the wife and mother, who has too little time for this very important branch of household work; she has had, perhaps, no good training in the art of cookery (for it is an art), and besides, her kitchen and kitchen utensils are not at all what they should be. Indeed, the qualifications for a given task could not well be further from the ideal.

In Europe families of small means have many helps unknown to us. In the first place, bread is never baked at home, the baker's bread being both excellent and cheap. It would seem that among us, baker's bread must shortly improve in quality and decrease in price; either the profits must be too large, or the business not well managed. For instance, in those parts of Germany where white bread is eaten as a staple, it costs a trifle over 3 cents a pound, while flour of average quality costs about the same. In contrast with this, compare the prices of bread and flour in our own country where in no large city is bread quoted at less than 7 cents, while flour costs 3 cents. That is, bread costs in Germany about the same as flour and in America more than twice as much; and yet the German baker is notably a prosperous person!

The foreign housekeeper has still further help from the baker. If she makes a cake or pie, she sends it out to be baked, and pays from one to two cents (the fuel would have cost more); joints of meat and mix dishes are also sent to be baked for the same price; and before any bakeshop in a German city, at noon on Sunday, can be seen a line of servant girls, each in turn receiving a steaming dish as it is taken from the oven. The soup kitchens (*Volks Küchen*) of various grades are also a great help. The writer has repeatedly had brought from one of them an excellent meat broth (1 pt. for 2

cents), and good cooked vegetables are furnished for a price less than they could be cooked for at home, if one took any account of time and fire.

But such helps are not yet to any great extent available to the American woman; she must wrestle with her own problem at home and solve it as best she can.

THE KITCHEN.

The kitchen of a woman of average means is not the ideal kitchen. It is perhaps too small or not light enough, or it may have still more serious defects, as a bad drain. We must take it as it is, however, requiring only that it contain what is necessary to the end we have in view,—plain cooking for a family of six.

Size of kitchen.

In the cheaper city dwellings the kitchen is small, too small for good ventilation, and for the heavier kinds of work as washing; but for cooking, a very small kitchen can be so arranged as to answer every purpose.

Any one who has seen a ship's kitchen can understand this. The cook as he stands before his range is within reach of all his stores, for rows of drawers and shelves literally line the walls from floor to ceiling, little tables for pastry or cake making are drawn out of the wall and pushed in again when not wanted, and every inch of floor and wall space is used to the best advantage. This cook would tell you that he did not want a larger kitchen; he would only lose time running about in it.

Arrangement.

Begin to utilize the wall space. If you have not yet as many shelves as the walls will accommodate, put up more, and especially about and above the stove, so that as you stand at your cooking you can reach salt, pepper and every other flavor that can be used in a soup or stew; cooking spoons and forks and knives, potlids and holders—all these should be at your hand. Let a carpenter fasten into the mortared wall strips of wood that will hold nails and a few shelves, and if the stove is in a niche with wall on two or even three sides of it, all the better. On these nails should hang nearly every implement used in cooking, and on the

shelves should be found all spices and flavors; farther back can be placed what is more seldom used. If there are no drawers, never mind, use close tin boxes for as many things as you can; if no closed cupboard for your dishes, hang a curtain before the open shelves.

The nearer your sink is to the stove the better, that is the path your feet must oftenest travel. There must be a table of some sort very near the stove; if it is a movable one, all the better, or it may be a broad shelf with a very strong and safe hinged support under it, letting down when not in use.

I take for granted that the main part of your work is to be done on this stove and table, and that a well stocked pantry, fitted out for the making of pastry and cake and elaborate dishes, is not within your reach any more than the time for making such.

Utensils.

The utensils you need are few, but these few you must have. Consider the value of the food materials that you use; a few burns on an old sauce pan will quite buy a new one. We will speak only of the most important and absolutely necessary utensils.

First, do not use tin; it is cheap, but coal is not, and you will waste a great deal of coal in trying to cook in tin. Brass and copper cooking vessels are to be avoided by one who must economize, as they are expensive and require too much care to keep them free from the poisonous verdigris.

Of chief importance among your utensils is a flat bottomed iron pot with close fitting *iron* lid. Get the smoothest and best, even if it cost double. In this you will roast meat with little fire, cook vegetables, all but peas and beans, cook anything indeed that is not acid. Have two of these, if you can, of different sizes. Next, an iron frying pan, also of the smoothest wrought iron and light; this too should have a close fitting cover. Some people consider iron utensils heavy and old fashioned, but where economy is an object, no other ware is so good and satisfactory. The blue or grey enamelled ware is very nice but will not stand great heat and easily chips and cracks, but you should have one kettle of this ware as it is valuable for cooking fruit and anything acid. You must have a wire gridiron for toasting bread and broiling meat; this you should use for many things which you now cook in the frying pan. The tea-kettle is a matter of course, and a griddle. There is one other utensil not as common, but which deserves to be, viz., a steamer: a simple pot with perforated bottom which will fit tightly into the top

of the iron pot, and have a very tightly fitting cover. Its use will be discussed later.

You can hardly do without a number of earthen jugs, glazed with lead-free enamel, especially for cooking and holding milk. Get also a number of wooden spoons; they are cheap and clean, and of convenient shape for stirring. The old fashioned pudding stick of the Yankee kitchen is the earliest form among us, and many people know no other.

Stoves.

A good stove is of first importance in a kitchen, but fortunately good stoves have become common. A graver question, however, is the cost of fuel to be burned in them. Of course coal must be the stand-by, and when the stove is heated up as on ironing and baking days, care can be taken to use the fire to its fullest capacity; in winter, dishes can be cooked ahead for several days.

Coal Oil.

To cook a single dish or for boiling a teakettle a coal oil stove is a saving; it is also invaluable for keeping a pot at a simmering heat—a thing very difficult to accomplish on a stove.

Charcoal.

For the same purpose, and for any steady cooking, and above all for broiling meat, every housekeeper ought to have appliances for burning charcoal; it only needs a grating with a rim two or three inches high, to let down into the stove hole (a sort of deep spider with a grated bottom). For such purposes, a bushel of hard wood charcoal costing fifteen or twenty cents would last a long time. Charcoal is almost the only fuel used in Paris for cooking; indeed, throughout France and in Western Germany it is in very common use.

"Cooking Safe."

For "Cooking Safe" as a saver of fuel, see page 194.

PROTEID-CONTAINING FOODS AND THEIR PREPARATION.

We have already in the introduction called attention to the importance of this food principle. It is well for us to bear in mind that there are three great classes of proteids, Albumens proper, Caseins, and Fibrins, and that in both plants and animals are found representatives of these three classes. Thus, in plant juices and in eggs we have things belonging to the Albumen class; in the curd of sour milk and in the legumine of the pod-covered plants we have examples of caseins; and in the gluten of grains and in the clot whipped out of blood we have examples of fibrins.

ANIMAL FOODS.

Our animal foods contain some other things that the housewife ranks with proteids and we have a few words to say about one of them, viz., gelatine, that nitrogenous substance boiled out of bones and cartilage.

Gelatine, Hist. of. In the history of foods this gelatine, like meat extract, has played a great part. Before the real functions of the food principles were understood it was thought that what could be extracted by water from a piece of meat comprised all in it that was of value to the body; and so it happened that for more than a hundred years after Papin had discovered the method of extracting all the gelatine out of bones (which he did by the aid of that contrivance still known in kitchens as the "Papin Soup Digester") gelatine was considered to be one of the most, if not the most nourishing constituent of meats. In the last decade of the eighteenth centuary, and in the early part of this the French made great use of gelatine under the impression that it was a proteid because it yielded nitrogen to the chemist. Improved methods of extracting it were invented, and so general did its use become, especially in the public institutions of Paris, that from 1829-38, two and three quarters million portions of bone-gelatine soup were dealt out to the inmates of a single hospital. But in spite of the opinions of

eminent scientists that gelatine soups and gelatine tablets were a perfect substitute for proteids, their consumption decreased; physicians again took hold of the subject, and by the middle of the century opinion had so changed that nearly all, if not all, food value was denied to them. Modern experimentation based on more rational methods has put gelatine in its right place. It is a food, just as much so as is fat, but like fat it cannot play the rôle of proteid although a certain amount taken with fats and carbohydrates will enable the body to get along with a little less proteid. It is even said by Prof. Voit to excel fat in its ability to do half duty for proteid material.

We have thought it well to speak of this because of a sort of superstitious regard in the kitchen for "stock," a survival, one would think, of Papin's time. A good German housewife was wont to discourse to the writer on the economical virtues of a certain "Frau Doctor" who "always boiled her bones three times" and dwellers in many a household have had their nostrils assailed by the smell of glue, during the sixth hour of bone boiling.

But if the importance of gelatine was and is still exaggerated, this is still more true of the other parts of meat that can be extracted by water.

Sol. Albumen and Extractives.

We have seen that hot water coagulates proteid, and once coagulated, it will not dissolve in water, and for this reason the soup generally contains of this valuable principle only the soluble albumen which rose as scum. If the cook has skimmed this off, the soup which she calls strong is strong with flavors rather than with nutritive principles.

To show how very little real food a good tasting meat soup may contain, we will give an analysis made by Professor König.

Analysis of soup.

He took 1 pound of beef and about 6¼ ounces of veal bones, and treated them, he says, as is usually done in the kitchen to get a pint of good strong soup or boullion. This contained

Proteids,	Fat,	Extractives,	Salts,
1.19 per ct.	1.48 per ct	1.83 per ct.	.32 per ct.

But where are the albumens that were in the meat to begin with? Many of them are still there in that stringy, sodden mass, the "soup meat," which the cook tells us contains no further value. It consists of cooked connective tissue and albumen; now these are foods and they must be rescued from the garbage barrel, for

with the help of the chopping-knife and the herb bag we can make them still do proteid duty in our bodies.

Real importance of soup.

If we do not overvalue either the gelatine or the flavoring matters in our meat soups, nor throw away the meat out of which they are made, we shall begin to make soups on the right basis. that is an understanding of the real value of the materials we are working with, and we shall use meat for our soups less often than we now do perhaps, considering its high price and our greater need of it cooked in other ways. Soups should not be regarded as a luxury, neither as the last resort of poverty, but as a necessary part of a dinner, just as they are now used by all classes in Europe; but they need not be made of good cuts of meat, nor indeed, of meat at all.

Proteid as we buy it.

We will now direct our attention to the proteid as we buy it.

We cannot here take up the chemical composition and exact nutritive value of every kind of meat to be bought at the butcher's stall, the fish market and the poultry stand. But we must note a few points of importance.

Butchers' meat.

We know that butchers' meat contains from 50 per cent to 78 per cent of water, according to the quality of the piece and the kind of animal. Most people in buying meat think first of the red part; they may know that it is advantageous to buy meat that is streaked with fat, but they hardly realize how wise it is to do so As a rule fat takes the place of water. Let us consult tables of analyses for the amounts of water, proteids and nitrogenous extractives, fats and salts contained in lean pieces and in pieces streaked with fat. In Prof. König's valuable treatise on Foods we find such analyses, carefully collected and sifted out of a large amount of material;

Prof. König's analysis of meat.

samples of neck, tenderloin, shoulder, hind-quarter and so on, just as bought at the butchers', were analyzed after being freed from adherent *lump* fat, and the average composition of all the different cuts was as follows:

Fat and lean ox compared.

	Water Per Ct.	Nitrogenous Substances. Per Ct.	Fat Per Ct.
From a very fat ox..	55.42	17 19	26.38
From a medium fat ox	72.25	20.91	5 19
From a lean ox	76.71	20.78	1.50

These tables illustrate how wise it is to buy meat from a very fat animal. They show that a pound of meat from a fat ox may have

more than 20 per cent less water than a corresponding piece from a lean one; of course such a piece may contain from 3 to 4 per cent less proteid, but to compensate for this, it will have 25 per cent more fat.

Let us give another table which illustrates that pieces like tenderloin are not the richest in proteids and fats, though they do have the finest flavor. It may help to console those whose purses do not allow them to buy these expensive cuts.

Dif. part of ox compared.	Water.	Nitrogenous substances.	Fat.
Neck.........	73.5 per ct.	19.5 per ct.	5.8 per ct.
Shoulder	50 5 "	14.5 "	34.
Tenderloin....	63.4 "	18.8 "	16.7
Hind-quarter ..	55.05 "	20.81 "	23.32

In this case the difference between shoulder and tenderloin as to the amount of water contained in each is striking. In the case of *medium* fat and lean animals, poor and good pieces approach each other more nearly in composition.

We regret that the scope of this essay will not allow us to give drawings and full illustrations of the different parts of an animal, with advice in detail as to what to buy. We are glad to mention in this connection a former prize essay—"Healthy Homes and Foods for the Working Classes"—which gives much information needed by the housekeeper as to the qualities and comparative value of the meat from different animals, of milk and milk products.

Some meats compared. Of butchers' meat, beef must always be considered the most economical, its choice being governed by facts just stated. Fat mutton also ranks high.

Pork. *Pork.* Say what we may against pork, it is a most valuable kind of meat, especially for the poor man, and the laws governing its slaughter and sale should be so stringent as to protect him. The great importance of salt pork and bacon we have considered under "Fats."

It is of little use to give rules about buying this meat; we must generally take what the butcher furnishes, but at least we can cook it well, never eating it raw even when well dried and smoked.

Fish. *Fish.* From the standpoint of the economist, fish is worthy of especial mention; nature does the feeding, we have only to pay for the catching. In the season when it is best and cheapest, fresh fish should be used freely. We have only

to remind the housewife that she loses ⅓ to ¼ of the weight of a fish in bones and head.

Salted and smoked fish.

Salted and smoked fish is of great importance as food, and not alone for people living on the sea-coast. Salted cod contains, according to König's tables, 30 per cent of Proteids, and this fact, together with its low price, fully justifies its popularity with all economical people.

Other salted and preserved fish, as for instance, the herring, give variety in the diet of many a poor family.

LIVER, HEART, ETC.

Internal organs.

Of the internal organs of animals generally considered eatable, we really appreciate only the liver. The lungs, brains, kidneys, heart, and the stomach prepared as tripe, are good food and they are often sold very cheap in country towns. The head of most animals, as of the calf, is excellent for soups and other dishes, and in the country it is often given away.

EGGS.

Eggs compared with meats as a food.

To get an idea of the comparative value of eggs as a food let us compare them with medium fat beef.

	Water.	Proteids.	Fat.
Medium fat beef has	72.5 per ct.	21. per ct.	5.5 per ct.
Eggs have	74.5 "	12.5 "	12.

We see that while the water is nearly the same in both, the meat has the advantage in proteids and the eggs the advantage in fat, the fat moreover, being of very fine quality.

Take eggs at their cheapest, as in April when they often sell at 15 cents a dozen, that would be 12½ cents a pound, 10 eggs of average size weighing a pound. They could then be considered cheaper than the highest priced cuts of meat, but still much dearer than the cheaper parts, flank, neck and brisket, at 8 cents. So that even at this low price, they are somewhat of a luxury to the man who must get his proteid and fat in their cheapest form.

And when we consider that only for a short time in the year is the price so low,—eggs being on an average quoted at 25 to 30 cents, the showing for them as a proteid rival of meat is poor indeed. Except in the spring the economically inclined must be sparing of their use even in dessert dishes. When housekeepers

say, as I have heard them, that eggs at 25 cents a dozen are cheaper than meat, they must be speaking in comparison with very high priced meats

CHEESE

Cheese (its food value.) In America, cheese is regarded more as a luxury than as a staple article of food, and yet 1 pound of cheese is equal in food value to more than 2 lbs. of meat, it being very rich in both fat and proteids. Considering this, its price is very low and it ought to be a treasure to the poor man and do good service in replacing sometimes the more expensive meats.

Use of cheese abroad. Its food value is fully recognized abroad For the Swiss peasant it is a staple second only to bread, while the use of it in Italy and in Germany is extensive. The writer once spent several weeks in the house of a large farmer on the slope of Mt Pilatus in Switzerland, and observed daily the food given to the harvesters; the luncheon sent twice a day to the fields consisted of a quarter section of the grayish skim cheese, accompanied with bread I was told that the poor people in the region ate scarcely any meat, using cheese in its stead.

The writer has also observed the use of cheese in Germany. Every locality has its special variety of the soft kind made of sour milk, and great amounts of the Swiss, both skim and full milk, cheese are consumed. It is generally eaten uncooked, but also as an addition to cooked food in a great variety of dishes.

Digestibility of Cheese. There is no doubt of the food value of cheese, but there does seem to be some question as to its digestibility. When we come to inquire into this point, we find that thorough experiments have been made by German scientists; Dr. Rübner, a pupil of Voit, gives the result of experiments on himself. He found that he could not consume much of it alone, but with milk he took easily 200 grams, or nearly ½ pound, and only when he took as high as 517 grams or over a pound daily, was it less completely digested than meat. Professor König says, that in the amounts in which it is generally eaten, 125 to 250 grams daily (¼ to ½ lbs.,) it is as well digested as meat or eggs. The extensive use of it abroad would seem to be some guarantee for the digestibility of the foreign varieties at least.

American cheeses have in general a sharper flavor than the foreign, still it is probable that well mixed with other food, enough could

be taken many a time, to give a man his needed daily quantity of animal proteid—between six and seven ounces—and this is a matter of great importance from an economical point of view.

METHODS OF COOKING MEAT.

Why cook.

And first—why do we cook it at all? In the animal as well as in the vegetable world some foods are all ready for our digestion, as milk. Raw eggs too, are perfectly digestible and are often given to invalids. We hear of "Raw meat cures," and it has been found that tender and juicy raw meat, if chopped fine to break the connective tissue, is well digested.

But raw meat does not taste good to most of us, while the delicious flavor and odor of a broiled steak make it very acceptable to the palate, and we must believe to the stomach also We "bring out the flavor," as we say, by cooking; what else do we do? Let us examine for a moment a piece of meat with reference to the effect heat has upon it.

Structure of meat.

The red part is made up of, first, very tiny sausage-like bags, or muscle fibres as they are called, and in these is contained the precious proteid matter, flavors and salts all mixed together with water into a sort of jelly; second, these muscle fibres are bound together by strands of connective tissue, as that white stringy mass is called, in which the fat and blood vessels are lodged; this is also of food value, but inferior to the fibres. Third, dissolved in the juices floating between the fibres and strands, there is also a proteid called soluble albumen. The little bags of proteid, when we can get at them, are as digestible in our stomachs as is the white of egg, though, like the egg again, their flavor is improved by slight cooking. But as we have seen, they are imprisoned in the connective tissue, somewhat, we may say, as are the starch grains of the potato in the cellulose.

Softening connective tissue.

This connective tissue we can soften by heat, thereby turning it into a sort of gelatine, but unfortunately, unless the meat is very tender, this requires a longer application of heat than is needed to cook the delicate albumen all full of flavors

too easily lost. To soften the connective tissue without overcooking the albumen, is one of the problems of meat cookery.

The next question is, how do our methods of cooking meet these requirements?

COOKING MEAT IN WATER.

1st method. Put a piece of lean meat into cold water, heat it very slowly and watch the effect. The water becomes slightly red, then cloudy, and as the heat increases, yellowish in color, and finally it clears sending a scum to the surface. If we examine this scum, we find that the water has soaked out much soluble albumen and a large proportion of the salts of the meat as well as other substantives called extractives; and now the odor of the boiling meat begins to fill the kitchen. The longer and slower the warming process, the more of all these things we shall extract, and the meat when taken out will be in just that proportion poor.

Soup making. This is the process known as soup making,—very simple, if we care nothing for the piece of meat but to soak out of it all the food and flavors possible. After some hours of cooking we find it shrunken, gray and tasteless. A dog if fed on that alone could not live many days. However, as we have before said, we are not to conclude, that it contains no more nutriment, but the stomach rejects it now that it is separated from all the flavoring matters.

2nd method. Now put a piece of meat into boiling water and continue the boiling. The surface of the meat suddenly whitens and a little scum rises on the water, though very little compared with what we saw in the former method. We have coagulated the albumen contained in all the little cells in the surface of the meat, and the soluble albumen, flavoring matters and salts cannot get out; the sealing up is not quite perfect, enough escaping into the water to make it a weak soup, but it is a good method of cooking a large piece if properly completed from this point. But if we *go on* boiling our meat, that is, keeping the temperature at 212°, we shall overcook the albumen in the outer layers before that in the centre is coagulated. By overcooking, we mean making it horny and flavorless, as we do the white of an egg if we cook it in the old-fashioned way, by dropping into boiling water and keeping it at that heat. Having seared the outside of the meat to keep the juices in, we must lower the temperature. The albumen coagulates

at between 160° and 170°, but the water in the kettle may be a little above this, as it must constantly transfer heat to the interior of the meat. The general rule is that it should "bubble" or "simmer" only, and if the cook can do no better she must follow these indications. That the true temperature for cooking meat is below the boiling point, many an intelligent housekeeper knows, but how is she to know when the water is at 170°? Here we come upon the weakest point in household cookery; various degrees of heat have different effects on the foods we cook, but of only one temperature is the housekeeper certain—that of boiling water.

For the use of the thermometer and the heat saver see page 194.

But to return; is there no way of cooking that will keep in the meat all these flavors and salts and albumens, just as nature mixed them? Yes, there are three ways—frying in fat, baking in an oven, and broiling over coals.

Frying in fat.

We will examine the first. If we plunge a thin piece of meat, as a cutlet coated with egg and breadcrumbs, into boiling fat, the albumen in the surface or rather in that of the egg surrounding it is coagulated as in boiling, but this time the outer rind preserves the juices still better because the fat will not mix with them as will water. Everyone knows how an oyster cooked in this way retains its juices.

Baking meat.

When we bake a piece of meat in the oven, we start in the same way; we sear the outside in fat, turning the roast about in a small quantity of fat made hot in a kettle; we then transfer it, still in the kettle or pan, to a hot oven where the process of cooking is completed, but at short intervals we moisten the surface with the fat in the pan. If we did not baste the roast, we would find a thick layer of grey, tasteless meat inside the outer brown crust, and indeed the whole piece would dry long before the center of our roast had reached the coagulating point; we baste, in order to keep in the juices which, as we know, will not mix with the fat, and also that only a mild degree of heat, not exceeding the coagulating point of proteids, may be transmitted to the interior. In the intervals of our basting, some water is driven out of the meat and evaporated into steam, and the high heat of the oven expends itself in evaporating this, in heating the basting fat, and perhaps (if it reach so high a temperature) in decomposing part of it, and in changing the chemical character of small quantities of

extractives, thus making the meat "tasty," and so it happens that only a mild degree of heat is passed into the center of the piece. We would hardly believe that the inside of a roast, with its light pink color, registers only 160° by the thermometer, yet this can be proved by any one with a long chemist's thermometer.

Although some of the water of our meat has evaporated, the extractives and salts are retained to a larger extent than in boiling, as we shall see by the table given later.

Broiling.

In broiling, the principle applied is exactly the same as in baking, the cooking being done by the medium of heated air. The dry heat of the coals affects the outer layer of the meat, as does the hot air of the oven. In both these methods, just as in boiling, we try to hold the temperature of our cooking medium just high enough to keep the heat traveling toward the interior of the meat.

We have now learned to cook the albumen enough and not too much and to keep the flavors of our meat; what about the connective tissue, and how has that fared with our different modes of cooking?

Tender meat.

If our meat is cut from the tenderer parts of an animal of the right age, well fed and fattened, and if it has been kept long enough after killing, the connective tissue will soften into eatable condition in the length of time required to cook the albumen by the methods described. Such meat, so cooked, will always be tender and full of flavor.

Tough meat.

But if the meat is cut from the tougher parts, or from an old or ill-fattened animal, or cooked too soon after killing, the connective tissue will not soften in that time; we must continue the application of heat till this tissue softens.

Methods compared: 1st, as to quality of meat.

Therefore, what method of cooking we shall use, depends on the quality of the meat we have. Trimmings and tough portions we will make into soups, expecting to chop the tasteless meat next day and add other flavors to make it palatable. Somewhat better pieces, but still requiring long cooking to soften the connective tissue, may be made into a stew or ragout; or if the piece is large and compact, boiled in water; but meat that is tender and juicy (and for improving tough meat see page 195) should be boiled, baked or broiled, choosing oftenest the last two methods, because of the more perfect retention of the juices and the fine flavor given to the outer layer.

2nd, as to economy.

We are told that baking or broiling is a very wasteful way of cooking meat; that if we would be truly economical we would always boil or stew, using our meat or its juices to flavor vegetables. From this we must dissent for it would condemn us to such a monotony as would be unendurable even to the poor. Better sometimes a smaller piece of broiled or baked meat with its delicious and stimulating flavor, and make our soup of vegetables and season it with herbs. Besides, according to the scientists, baking and broiling are *not* wasteful methods. I quote from a table of Professor König's, wherein are given the results of analysis of beef raw, after boiling and after "*braten*." Raw, it contained .86 per cent extractives (nitrogenous bodies mostly; very important as giving the stimulating smell and taste) and 1.23 per cent. salts

	Extractives.	Salts.
Raw.	.86 per ct.	1 23 per ct.
After boiling.	.40 "	1.15 "
After "*braten*".	.72 "	1.45 "

The advantage is seen to be in favor of *braten*, both in regard to extractives and salts. The loss of water was nearly the same in both cases. As for the fat lost in broiling a beefsteak, that is indeed a loss, but one to be made up in some measure by the smaller quantity of fuel necessary to cook the meat. The loss of this fat need not be made so much of, until we have learned to do better in many other still more important directions.

The philosophy of cooking meat according to the different methods has been treated, and we will now give a few additional directions as to carrying out these methods.

SOUP MAKING.

Materials for soup making.

Lean meat of any sort, beef best; fresh, better than that long kept; bones of next value, especially the spongy rib bones and vertebræ. Saw and chop the bones into little pieces,—cut the meat small. Soft water is better than hard.

Method of making.

Keep a kettle, if possible, for this purpose alone, and add to it all bits of meat and bones as they accumulate. Put the meat into cold water, let it stand some hours if possible, heat very gradually and keep *simmering*. Two hours or less brings out all the flavors of the meat, but a much longer time is necessary to get all the nutriment from the bones.

Skimming. Do not remove the scum; it contains the albumen of the soup, and nothing objectionable if the meat was well cleaned.

An hour before the soup is served add flavors; onions and carrots are the best, celery, summer savory, and parsley next. Use others, as cloves, nutmeg, bay leaf, etc., only occasionally. Add salt and pepper just before serving.

When done, strain and skim off all fat (better if left to stand till next day, the fat removed and the soup simply rewarmed), and make such additions as you wish.

[We prefer our soups with the fat removed, but the laboring people of Europe with their hardy stomachs find a soup much better if covered with "eyes."]

These rules apply to all meat soups. Mutton makes a strong and nutritious soup, veal a delicate soup. An excellent soup is made from a calf's head.

BOILING.

To boil meat. Put the meat into boiling water, bring quickly again to a boil and keep so for 10 minutes, then lower the temperature (as see page 189), and so keep it till the meat in the center has reached 160°–170°, or has changed in color from bluish to red, our usual test. For use of the "Cooking Safe" for this purpose, see page 194. Braising, "a la mode," kettle roasts, &c., are but modifications of this method.

To make meat stews. This is a combination of soup making and boiling. Use inferior parts, cut in pieces and cook, at 170° if possible, till tender. Half an hour before serving, season in any way you wish. See page 197.

FRYING IN FAT.

How to prepare suet in which to fry meat. Lard if used for this purpose should be tried out at home, but beef fat is cheaper and if nicely prepared no one can object to the taste.

Cut the fresh suet in pieces, and cover with cold water; let it stand a day, changing the water once in the time. This takes out the peculiar tallowy taste. Now put it in an iron kettle, with a half teacup of milk to each pound of suet, and let it cook very slowly till the fat is clear, and light brown in color, and till the

sound of the cooking has ceased. The pieces may be loosened from the bottom with a spoon, but it is not to be stirred; if it burns the taste is ruined. Now let it stand and partly cool, then pour off into cups to become cold; it smells as sweet as butter and can in many cases be used instead of it The fat left still in the pieces may be pressed out for less particular uses.

Any clean fat, even mutton, has its uses in cookery, and should be tried out and kept nicely.

Oils for use in frying.

There are oils now sold which but for prejudice we would always use. *Pure* cotton seed oil is a fine oil with a delicate flavor; rape seed oil, which is used extensively abroad for this purpose, is also a pure vegetable oil, but somewhat rank in flavor. It is treated thus: a raw potato is cut up and put into the kettle, heating with the oil and cooking till it is brown, it is then taken out and the oil used like lard. The potato has absorbed the rank flavor.

Thin pieces of meat, like cutlets and chops, are coated with beaten egg and bread crumbs, and cooked in boiling fat for 5 to 10 minutes, according to the kind of meat

To bake meat.

Make some beef fat hot in an iron pan or broad kettle. Put the meat into it, and with a fork stuck into the *fat* part, turn it rapidly till it is on all sides a fine brown, then put it into a hot oven (about 340° F.), elevating it above the pan on a meat rack, or a few iron rods. Now comes the process

Basting.

called basting; in five minutes or less you will find that the top of the meat has dried, and you must now dip, with a spoon, the hot fat from the pan over the top. Do this every few minutes adding *no water* to the pan; you will find your meat well cooked in from twelve to fifteen minutes to the pound. It is done when it has lost, in the middle, the blue color, and become a fine red. Only salt and pepper should be used to season such a roast, and must be added when the meat is half done; if earlier, it toughens the fibres.

To broil meat.

But when fuel is expensive, or in summer when a hot fire is a nuisance, the perfectly cooked meat can also be obtained by broiling; the management of the fire is the only trouble. We are told that a beefsteak for broiling should be cut three-fourths of an inch thick, and put over a hot fire of coal or charcoal; quite right, but when it has browned quickly, as it should, and been

turned and browned on the other side, it yet remains raw in the middle and if left longer, the surface burns. This is the experience of the novice, who has yet to learn two things; first, that immediately after the first browning, the fire must decrease in heat, or the meat be brought further away, so that the steak may cook ten to twelve minutes without burning—less time will not cook it nicely in the middle; and second, that like baked meat, the surface must be kept moist with hot fat. Before your steak is put over (unless it be very well streaked with fat), cover both sides with melted suet, and afterwards, as it dries, spread on a little butter or beef fat. Have ready in a hot platter a few spoonfuls of water in which the bones cut from the steak have been boiling, also salt and pepper. When the steak is done, lay it in the platter and keep it hot for five minutes, turning it once in the time; thus you will have both good steak and good gravy.

Use of charcoal. Professional cooks always use charcoal for broiling, and its advantages are great. As described on page 180 it needs only a simple contrivance, easily adjusted to any stove; a handful will broil a pound of steak, and the cooking of the rest of the dinner can go on without interference.

USE OF THE THERMOMETER IN COOKING MEAT.

To cook meat at a temperature of between 150° and 160° F., is no easy matter with the usual kitchen appliances. Even over a easily regulated heater, as a gas or coal oil flame, how are we to know that temperature when it is reached? The writer, knowing of no thermometer arranged for use in a kitchen, constructed a simple one after the model of those used in laboratories. A thermometer tube registering 300° Celsius was simply fastened into a cork, the bulb projecting below and protected by a short cylinder of wood. This floated on the water and made it easy to cook at any given temperature. This thermometer was also hung in a light wire frame and used for testing the heat of an oven.

THE HEAT SAVER.

It is a part of common information that the inhabitants of northern countries make extensive use of non-conducting substances, like wool, for preventing the escape of heat from a vessel in which cooking is going on. It is strange that we do not make more use of such appliances, for they have often been described and illus-

trated; it is probably because they are not found ready-made, and with a complete list of directions for use. The writer made and used a cooker of this sort, and after considerable modification and experiment it became a very useful thing in the kitchen. If you wish to cook meat at the proper temperature, this contrivance makes it possible to do so, and is also very saving of fuel.

Directions for making heat saver.

Take a packing box measuring, say, two feet each way and cover the bottom with a layer of packed wool four to six inches thick; set into the middle of this another box or a cylinder of sheet iron and fill the space between the two with a layer of wool, four to six inches thick and closely packed. Into the inner compartment put your kettle of meat or vegetables already brought to the boiling point and having a tightly fitting cover, and over this press a thick pillow or woolen blanket. Then fasten down tight over all, the lid of your box. As the heat in the water must finish the cooking already begun, its amount must be rightly proportioned to the amount of food to be cooked, *e. g.*, two quarts of water to one and one-half pounds beef rib, were used. The water was brought to the boiling point, the meat placed in it and allowed to boil for five minutes, the pot was then tightly covered, placed in the box and allowed to remain three hours. At the end of that time the meat was tender.

TO MAKE MEAT TENDER.

To make meat tender.

It is well known that meat must be kept some time after killing to make it tender. In winter, a large piece of beef or mutton will keep for six weeks if hung in a dry, cool place Indeed, this is the time allowed in England for the Christmas "shoulder of mutton," and every few days it is rubbed over with salt and vinegar. In summer, unless the butcher will keep the meat for you, you must resort to other means.

A tough piece of meat may be laid in not too strong vinegar for three or four days in summer and twice as long in winter, adding to the vinegar such spices as you may like. To soften a tough steak pour a few spoonfuls of vinegar on and let stand for twelve or twenty-four hours. This method has been long recommended and is to some extent used among us; the foreign cook employs sour milk for the same purpose and with even greater success, but this must be changed every day and at the end of the time well washed from the meat.

We cannot too strongly urge that the housekeeper, especially if she be straightened in means, should become used to these methods and practice them occasionally. She does not want to confine herself to soups and stews and she cannot buy "porter-house" steak at 20 or 25 cents a pound, but she can buy "round" at half that price, and after a little experiment can make it tender for boiling, roasting or broiling by one of these methods. In winter, she should buy a supply of meat ahead and keep it until it grows tender.

RECIPES FOR COOKING MEATS.

The methods of cooking meat having been treated and mention made of the parts adapted to each, it remains only to give practical hints as to making and varying dishes.

BEEF.

Boiled, roast and broiled beef have been sufficiently dwelt upon. See pages 192-93.

Stews and ragouts. No mode of cooking meat has so many variations; the flavor of the meat being used to season vegetables of every sort, also doughs, as in dumplings, or in the crust of meat pie. For making meat stews see page 192.

With potatoes. One-half hour before the meat is done lay on top of it peeled potatoes, all of the same size, and serve when done with the meat and gravy.

Meat pie. When the meat is cooked tender, thicken the gravy and pour all into a pie or pudding dish. Cover with a common pie crust or one of mashed potatoes, and bake ½ hour.

You may also mix sliced raw potatoes with the stew, in layers.

Potato Crust. 1 cup mashed potatoes, 1 egg, 2 tablespoons butter, 1 cup of milk, salt. Beat together till smooth, and then work in enough flour so that you can roll it out. It should be ½ inch thick, and as soft as you can handle.

With tomatoes. Add to meat when tender, 1 quart tomatoes to 2 pounds meat. Thicken with flour and stew 5 minutes.

Flavors for stews. Stews are variously flavored; onion, salt and pepper, are always in place A little lemon juice added as it is served gives a delicious flavor, or even a tablespoonful of vinegar may be used. Any herbs, a piece of carrot, a clove or bit of garlic, may be used for variety. Catsup is also good as a flavor.

Corned beef. Wash it well, put into plenty of cold water and bring slowly to the simmering point. Cook 3 to 4 hours.

Turnips or cabbage are often eaten with corn beef. They should not be boiled with the meat but in a separate pot.

Beef liver. If from a good animal, beef liver is often as tender as calf's liver.

Broiled. This is the best method. Soak an hour in cold water, wipe dry, slice and dip in melted beef fat. Broil *slowly* (see page 193) till thoroughly done; then salt and butter.

Fried. When prepared as above, the slices of liver may be fried in a pan with a little beef fat. This gives an opportunity for more flavors, as onions may be fried with it, a little vinegar added to the juices that fry out, then thickened and used as gravy.

Baked. If liver is not quite tender it can be made into a stew, or it may be chopped fine, mixed with bread crumbs and egg and baked ½ hour.

Beef's heart. If fire is no object, you may boil a beef's heart, it will take all day. Put into cold water and bring slowly to the simmering point and keep it there. Next day it may be stuffed with well seasoned bread crumbs and baked ¾ hour.

Tripe. Cut in strips, soak in salt and vinegar ½ day, wipe dry and fry in hot lard. It may also be stewed.

RECOOKING BEEF.

(A) Boiled, baked or broiled beef which is tender and full of flavor.

To serve roast beef a second time.

Roast beef re-served. Heat the gravy, put the roast in it. After trimming it into shape again, cover closely and put into a hot oven for ten minutes or less according to size of piece.

Or, cut in slices and lay in hot gravy only long enough to heat them through.

Hash. Being full of flavor such meat may be chopped and mixed with from ⅓ to ½ as much chopped or mashed

potatoes, bread crumbs or boiled rice These mixtures may be warmed as hash, or made into cakes or balls to be fried on a griddle or in boiling fat.

Mix the chopped meat with the potatoes, bread-crumbs or rice as above, add salt and pepper and make quite moist with water or soup. Put a good piece of butter or of beef fat into a spider, and when it is hot, put in the hash Cover and let it steam, then remove cover and let it dry out while a brown crust forms on the bottom. *Or*, stir till hot and dish immediately.

Hash balls. Make not quite as moist as for hash, form into little cakes, dust with flour, and fry to a nice brown in a little beef dripping on a griddle. *Or*, egg and bread crumb the balls, and fry in boiling fat.

RECOOKING SOUP MEAT.

(B.) This meat, though made tender by long cooking, has given much of its flavor to the soup. It has not, to the same degree, however, lost its nutritive value ; if we can make it *taste* good again, both palate and stomach will approve it.

It will not do to mix this meat with neutral substances like potatoes and bread ; it needs addition rather than subtraction.

In any case, first chop the meat very fine.

Pressed soup meat. Season the chopped beef well with salt and pepper and some other addition, as celery salt or nutmeg, or some of the sweet herbs. Moisten with soup or stock, pack in square, deep tin and place in the oven for a short time. To be sliced cold, or warmed as a meat hash to be served on toast.

Meat croquettes. When so good a dish as this can be made out of soup meat, it is worth a little trouble.

Ingredients. Two cups of the chopped beef, 1 tablespoon butter, 1 tablespoon flour, 1 egg, ½ a lemon or 1 tablespoon vinegar, a few gratings of nutmeg and ½ cup of stock or milk.

Cook the flour in the butter and add the stock or milk and seasoning, then the beef, and cook, stirring all the time till the mass cleaves from the side of the kettle. Let it get cold, then make into little egg shaped balls, let them dry a little, roll in beaten egg and bread crumbs and fry in boiling fat.

To vary—add one-third as much chopped salt or fresh pork as you have meat.

VEAL.

This meat takes other flavors well and is used by cooks for all manner of fancy dishes. It is lacking in fat and for that reason easily dries in cooking; an addition of pork is always an advantage to the taste. It must be always well cooked, never rare.

Roast veal. This may be a piece cut from loin, breast or shoulder, or a rib piece. Roast like beef (see page 189), allowing twice as long, or 1½-2 hours, for any piece under four pounds.

Broiled veal chops. Cutlets, chops and steaks are broiled like beef, but slower and twice as long and must be buttered and floured to prevent drying. Should be served with a tomato or onion sauce.

Veal stew. Cook like beef stew, see page 196.

It may be varied in the same way and is generally more highly seasoned. Especially good as pot-pie. Salt pork should be added to it.

Liver sweet breads and heart. Veal liver, sweetbreads and heart are all tender and excellent, but high priced, especially the sweetbreads. Liver and heart are prepared like the same parts in beef (see page 197), but the heart cooks tender in two hours. This latter is an excellent dish, do not soak it—stuff with well seasoned bread crumbs and bake, basting well.

MUTTON AND LAMB.

Mutton and Lamb. The quality of mutton is so varying that when cooked the dish is often a disappointment. The influence of long keeping or "hanging" upon it is even more beneficial than upon beef.

Mutton fat. *Fat of Mutton.* Some cooks trim away every bit of fat from mutton. It is perfectly wholesome, but sometimes gets a taste from coming in contact with the hide or hair of the animal; hence the prejudice. Scrape the outside of the meat well, pulling off the dried skin and cutting away the dark ends.

Pieces to roast. Unlike beef, other pieces besides the rib are good for roasting; the loin and haunch are most economical, the shoulder next, the leg next. Roast like beef, see page 189.

Unless the meat is first class, do not roast, but boil it. The leg is oftenest used for this purpose.

To boil mutton. Simmer about 12 minutes to the pound; that is the rule, but very frequently the meat when it comes on the

table, will be tough, owing entirely to the difference in the quality of the meat. Such meat must be boiled twice as long, or is better cooked in a stew.

Mutton chops. The chop is oftenest broiled and is a famous dish. Cut $\frac{3}{4}$ in thick, and broil rare like beef.

Chops and cutlets are excellent fried in fat. See page 192.

Mutton stew. This is the most economical and perhaps the most satisfactory of all mutton dishes. The inferior parts, as the neck, are as good as any for this purpose. Proceed exactly as with beef stew.

A good stew is made from sheep's kidneys.

Sheep tongues. These may be mentioned because sometimes thrown away or sold very cheap. Clean well, and simmer $1\frac{1}{2}$ hours, with a little pork and onion. Add to the gravy 1 tablespoon of vinegar.

All these recipes for mutton apply to the cooking of lamb; remembering however, that lamb, like veal, must be thoroughly cooked.

PORK.

Pork does not need to be kept in order to be tender, that is one of its great recommendations to the housekeeper. It is also easily cooked and we may lay aside some of the precautions we use regarding beef: the lean of fresh pork however, is apt to dry in cooking.

Roasting pieces. The leg, the loin and the chine are good roasting pieces as well as the rib. Pork is so rich in flavor that it seasons finely a bread crumb dressing, to which add a little sage and vinegar or chopped pickles. Bake separately, and lay around it when served. Or better, though more trouble, make holes in the roast and force the stuffing in.

Put directly into a hot oven in a pan containing some hot fat, and baste very frequently till done. Allow at least 20 minutes to the pound.

Steaks and chops. Steaks and chops are broiled, but the surface must be kept well moistened with butter or beef fat, or they will be dry and tasteless.

Stew of pork. Fresh pork is seldom boiled and it is too fat for a stew, though the lean may be selected and cooked like beef stew. It makes also an excellent potpie, or meat pie. See page 196.

Pig's liver. Pig's liver is good cooked like beef's liver, and is cheaper. See page 197.

Pork sausage. The cooking of this is very simple. Fry brown in a frying pan on the stove, or better, set the pan in a hot oven, you will then avoid the sputtering of the fat.

HAM, SALT PORK AND BACON.

Ham may be cooked in any way in which fresh pork is cooked. It may be cut in one-half inch slices, or thinner, and broiled or fried lightly in a pan. If long cooked it becomes tough and dry. If too salt for this, it may be soaked a half hour in warm water.

A large piece of ham is best boiled. If very salt, soak it in cold water for twenty-four hours, then put into cold water, bring slowly to a boil, and simmer half a day if the ham is of good size. A ham may also be baked.

Dishes from cold ham. So highly flavored a meat can be used in numberless ways, especially combined with vegetables and bread.

Sandwiches. Chop one-half pound fine, season with mustard, pepper and one tablespoon vinegar. Spread between slices of buttered bread.

Ham cakes. Take one cup finely chopped boiled ham, two cups of bread crumbs, two eggs, pepper and salt, and enough milk to make quite moist.

To use. 1st. Fry on a griddle in small spoonfuls, and turn as pancakes.

2d. Use mashed potatoes instead of bread crumbs, and fry as above.

Croquettes. 3d. Take either of the above mixtures, using, however, little or no milk, make into little balls and after rolling in egg and bread crumbs, fry in boiling fat.

With eggs. 4th With eggs. Put either of these mixtures into a baking dish; smooth the surface and make little hollows in it with the bowl of a spoon. Put in the oven till hot, then break an egg into each depression, and return to the oven till the eggs are set.

Broiled salt pork and bacon. After slicing thin, freshen salt pork by laying in cold water over night or one-half hour in warm water. Broil till transparent and a delicate brown in color. Broil bacon without freshening.

Fried. Less delicate than broiled, but much more economical, because saving the fat. Fry only till transparent. Salt pork must be first freshened. To make milk gravy of the fat, see "meat and vegetable sauces."

Both salt pork and bacon are boiled with vegetables.

Bacon or Pork and Cabbage. This is a favorite mixture, and if the cabbage is only boiled half an hour and not in the same pot with the pork, it is not an indigestible dish. Put the pork into cold water, bring slowly to a boil and simmer from one-half to two hours, according to size of piece.

Pork and peas. Cook 1 qt. dried peas according to directions for pea soup. Boil pork with the peas during the last hour, or after parboiling, bake like pork and beans.

Pork and beans. Cook 1 qt. beans according to soup recipe. Parboil 1 lb. salt side pork, score the skin in squares, half bury in the beans and bake two hours, or till a nice brown.

Pork and potatoes. Slice a dozen potatoes thin, also ¼ lb. fat salt pork, put into a pudding dish in alternate layers, seasoning with salt and pepper (only a little of the former). Bake, covered, ½ hour, uncover and brown.

Pork and apples. Fruits seasoned with meat juices and fats, instead of with sugar, are not enough known among us.

Slice sour apples round in slices ½ in. thick without peeling, and fry with strips of pork or bacon. Serve together.

FRESH FISH.

The varieties of fresh fish are numberless, and to cook and serve them in perfection requires careful study from the cook. The subject must here be treated very briefly.

Fresh fish may be cooked in any of the ways applicable to meat, the length of time being much shorter, and care being required on account of the delicacy of the fibre. This makes broiling somewhat difficult. Small fish are perhaps best egged and bread crumbed and fried in hot fat.

Fish chowder. This dish deserves especial mention because of its cheapness and good flavor. It may be made of any fresh fish.

Fill a pudding dish with the fish cut in pieces, seasoning each layer with salt and pepper, and bits of suet or fat pork; put over it a potato crust as for meat pie (see page 196), or a soda biscuit

crust, and bake. Bread crumbs or sliced potatoes may be mixed with the fish, and more seasoning used.

Fish soups. Fresh fish can also be made into soups, and the cheaper kinds should be more used for this purpose.

Codfish soup. Cook 1 tablespoon of flour in one tablespoon of butter. Add 1½ qts. milk, or milk and water, and when it boils stir in 1 teacup of cold boiled codfish that has been freed from skin and bones and then chopped fine or rubbed through a sieve. Add salt and pepper to taste.

Bullhead or catfish soup. An excellent soup can be made of this cheap fish. Clean and cut up 2 or 3 lbs. and boil an hour in 2 qts. water with an onion and a piece of celery or any herbs (it must be well seasoned). Then add 1 cup of milk and a piece of butter or beef fat, or a piece of salt pork cut in bits may be boiled with the fish.

SALT FISH.

Salt cod. This is one of the cheap foods that seems to be thoroughly appreciated among us, and good ways of cooking it are generally understood.

It must be freshened by laying it in water over night; put into cold water and bring gradually to a boil; set the kettle back where it will keep hot for half an hour, separate the flakes and serve with a milk sauce.

Fish balls. This favorite dish is prepared by adding to codfish, boiled as above and finely shredded, a like quantity of mashed potato. Make into balls and fry on a griddle or in boiling fat. Any other fish can be used in the same way.

FOWLS.

The flesh of fowls cannot rank among cheap foods, but in any economical family the Sunday dinner may often be a fricassee made of a fowl no longer young. Unless very ancient, the flavor of such a fowl will be richer than that of a chicken; we have but to cook it till it is tender.

Old fowl fricasseed. Cut into joints, put into cold water and bring slowly to a simmering heat; on no account let it boil,—keep it as nearly as possible at 170° for 3 or 4 hours, or till it is very tender. At the end of 2 hours, add a sliced onion and salt and thicken the gravy.

Chicken soup. None but the wealthy should use chickens for soup, but from the bones left of baked or fricasseed chicken

a good and economical soup can be made. Boil an hour or two, take out the bones, thicken a little and serve with bread dice fried in butter.

Giblet soup. An excellent soup can be made of the *giblets*, that is, heart, liver and neck of chicken, and other fowls, which in city markets are sold separately and very cheap. Cut in small pieces and boil 2 hours with onion and herbs, then add a little butter and thickening, salt and pepper.

EGGS.

The importance of eggs is to be estimated from various points of view; their food value is great, their digestibility when fresh is almost perfect, and they can be cook·d in so many ways and are a necessary ingredient of so many dishes, that the cook could ill spare them. Indeed, in all countries, their consumption seems to be limited only by their price.

Freshness. After the first twenty-four hours an egg steadily deteriorates. Physicians say, "never give to an invalid an egg that is more than two or three days old "

There are methods in use for preserving eggs fresh, on the principle of excluding air by sealing up the pores of the shell, but none of them are without risk and they cannot be recommended to one who must economize closely. It is better to go without eggs as nearly as possible in winter.

Raw eggs. Eggs are as digestible raw as cooked, and one easily comes to like the taste of a fresh raw egg beaten to a foam and mixed with a little milk or water and sugar, flavored with a little nutmeg or jelly.

Soft boiled eggs. To soft boil an egg its temperature should not be raised above 170°. The white will then be a jelly-like, digestible substance, but if exposed to a higher temperature, the white becomes horny while the yolk remains uncooked or becomes pasty. There are two methods of boiling an egg properly, which may be adopted according to convenience.

1st. Allow one quart of boiling water to four eggs. Use a pail or jar (heated before the water is put in) and wrap around with a flannel cloth. The eggs will be done in six minutes, but are not harmed by ten.

2d. Put the eggs into cold water and bring slowly to a boil. They are done when the water begins to boil.

Hard boiled eggs. To boil an egg hard, it is no more necessary to expose it to a high degree of heat than in the case of the soft boiled; the heat must simply be much longer continued, twenty minutes to a half hour. The egg will then be solid but not horny as when cooked in boiling water.

A great many attractive dishes can be made of cold boiled eggs.

Scrambled, poached, omelet, and baked eggs. These are but different modes of cooking eggs soft or solid. The taste will be more delicate and they will be more digestible if in these cases also only the low degree of heat above mentioned be applied—more time being given them than is usually allowed.

EGG DISHES.

These dishes under many names and in many forms are of next importance after meats, composed, as they generally are, of eggs and vegetables or some preparation of the grains, while numberless additions and flavors are used to give variety and make the dish tempting to the eye and palate. Eggs so prepared have their full nutritive value; not so in rich puddings and cakes, where they are mixed with more sugar and fat than the system can take up in any quantity.

The following are a few recipes that have not been included under other heads. Many others will be found under the Cooking of the Grains.

Bread omelet. One cup of hard bread partly softened in hot water and milk, or in cold water (in which case press in a cloth and crumble), add one-half of a chopped onion, one tablespoon chopped parsley, one egg, salt and pepper. Heat in the frying pan or square baking pan, some bits of suet or beef fat, and pour in the omelet. Cover and bake five minutes, then uncover and brown. Or it may be cooked slowly on top of the stove. Cut in pieces and serve around the meat or with a gravy.

Egged bread. Bread, fresh or stale, is cut in long strips, or in squares or rounds with a cake cutter. Let them soak till soft but not broken, in one pint of salted milk into which two eggs have been beaten. Bake a nice brown or fry on a griddle in half suet and half butter. (May be made with one egg.)

Potato omelet. Fry a small onion, sliced, in a teaspoonful of butter or fat; fill the pan with two cups of cold sliced potatoes, salt and pepper them, and pour over them two beaten eggs. Bake

slowly till it is just solid and turn out carefully on a platter. *Or*, one cup potatoes and one cup bread crumbs may be used.

Rice omelet. One cup cold boiled rice, two teaspoons milk, one egg, one-half teaspoon salt. Mix and pour into a pan in which a tablespoon of butter has been heated. Fry and double over when done. *Or*, it may be baked like a potato omelet.

Flour omelet. One egg. 1 cup milk, 2 tablespoons flour, pinch of salt, add the beaten white of the egg last.

This is the "Yorkshire pudding" which is cooked in the pan over which beef is roasting; it is cut in squares and served around the meat. It may also be baked in a buttered pan without meat.

T mato omelet. Three eggs, 1 cup flour, (scant), 1 tablespoon fine herbs, salt and cayenne pepper, 1 tablespoon sugar, juice of 2 large tomatoes and 1 cup warm milk. Bake under roasting meat or alone in a buttered pan.

CHEESE DISHES.

Almost any cheese will give a good result in these dishes. Crumbly cream cheese is richer in taste and has also been shown to be more quickly digested. Skim cheeses are as nutritious except in fat, and in some dishes, as in "Fondamin" give a better result. Grate old cheeses, chop new and soft ones.

Grated cheese. Grate old cheese and serve with bread and butter. It is also a good addition to mashed potato, to flour porridges, to oatmeal and wheat flour porridges, to rice, sago, tapioca and indeed to any starchy foods; it should be stirred in while these are quite hot. Its use with macaroni is given elsewhere.

Cooked cheese with bread. The basis of these dishes is toasted bread (white or graham) arranged on a platter, and enough salted water poured on to soften it.

1. Grate enough old cheese to cover the toast prepared as above. Set in the oven to melt, and put the slices together as sandwiches. This is the simplest form of "Welsh Rarebit."

2. One-half pound cheese, 1 tablespoon butter and 1 cup milk. Stir till smooth over a gentle fire or in a water bath and spread over the toast.

3. One-fourth pound cheese, 1 tablespoon butter, 2 egg yolks, ½ teaspoon mustard, a pinch of cayenne pepper. Stir to smooth paste, spread on the toast and set in a hot oven for 4 minutes.

4. To each person allow 1 egg, 1 tablespoon grated cheese, ½ teaspoon butter or 1 tablespoon milk, a little salt and pepper (cayenne best). Cook like custard in a pail set in a kettle of hot water, stirring till smooth, it may then be used on toast or poured out on a platter. It may also be steamed 5 minutes in little cups, or baked very slowly for 10 minutes.

5. Slices of bread lightly buttered, 3 eggs, 1½ cups milk, 1 teaspoon salt, 1 cup grated cheese. Soak the bread in the milk and egg till soft but not broken. Lay the pieces in a pan, cover with the cheese and bake or steam.

Fondamin or Fondue. This is a famous foreign dish, and although it may seem to have a good many ingredients, it is really not much trouble to make.

One-fourth pound grated cheese (skim better than cream) add to 1 gill of milk, in which is as much bicarbonate of potash as will lie on a three cent piece, ½ teaspoon mustard, ½ saltspoon white pepper, a few grains of cayenne, 1 ounce butter, a grating of nutmeg and 2 tablespoons baked flour. Heat carefully till the cheese is dissolved. Add 3 beaten eggs and stir till smooth. This mixture should be baked separately for each person in patty pans or paper cases and eaten immediately. All cheese dishes should be served very hot.

MILK.

Milk is sometimes called the one perfect food, containing all the constituents in their right proportions. This is true only for the requirements of a baby, but it remains for any age a valuable food when rightly supplemented.

Milk contains on the average 3.31 per cent proteids, 3.66 per cent fat, 4 9 per cent carbohydrates, 87 41 per cent water, and .70 per cent salts.

The housewife, if she wishes to use milk with economy, will not in cooking use it *as such*, but with due regard to the different values of the cream and the skim parts. In cities skim milk is sold for about one-half the price of full milk, and is well worth it if pure, but it is too often mixed with water.

Boiling milk. As soon as milk comes into the house it should be boiled, as it is a notorious carrier of disease germs which only in this way can be killed. Use an earthenware pitcher and let the milk remain standing in the same after cooking. The

next day remove the cream for the morning's coffee, and use the skim part during the day for cooking, with or without the addition of a little butter.

Keeping milk. To keep milk sweet in warm weather is a serious question to the housekeeper who has no cellar or refrigerator. It is of first importance that the vessels used to contain it should be scrupulously clean Boiling, as above mentioned, and cooling it rapidly afterwards, will keep it sweet for 24 hours, unless the weather is very warm, and the time may be further extended by keeping the milk pitcher set in a dish of cold water. A quarter of a teaspoonful of baking soda to a quart of milk, added while it is still sweet, may be used in case of necessity but this is not to be commended for common use.

Canning milk. A method that the writer has employed is this: simply canning the milk as one would can fruit Fill glass jars and screw down the lids, then place them in a steamer over cold water; heat the water gradually and steam the jars for an hour, then tighten the tops. I have never kept milk so treated for more than a week, but see no reason why it should not keep much longer.

Sour milk. However, if you find yourself with sour milk on your hands, do not throw it away, it has many uses. Buttermilk is also very valuable to the housewife; it can be kept a long time in good condition for mixing doughs by covering with water, which must, however, be often changed for fresh.

USES FOR SOUR MILK AND BUTTERMILK.

Bonny clabber. Put skim milk into a glass dish or into tea cups and set away until it becomes solid. Then eat with sugar and powdered cinnamon sprinkled over it.

Cottage cheese. Set thick sour milk where it will heat gradually till the curd separates, then pour into a bag and let it drip till dry. Salt well, and add a little cream or milk and melted butter.

Buttermilk. 1st. As a drink. For this it should be very fresh.

2d. Buttermilk soup. (See another page.)

Uses for both. Both buttermilk and sour milk can be used

1st In making soda biscuit dough (see another page).

2d. In pancakes of all kinds (see another page).

3d. In corn bread (see another page).

4th. In some kinds of cake, as in gingerbread, cookies and doughnuts, where they are by many cooks preferred to sweet milk; and in almost any kind of cake sour milk may be substituted for sweet, remembering always to use only half the quantity of cream of tarter called for in the recipe.

FATS AND OILS.

The third food principle, fats, stands between the two great nutrients, proteids on the one hand and carbohydrates on the other, and we find that we can indulge in considerable latitude as to its use. When we wish to get our food in a more condensed form, we can use fats freely in connection with proteids and lessen the amount of carbohydrates. In army dietaries the amount of fat is largely increased for marching, and for great exertion the quantity becomes three times that allowed in garrison life. For instance, the daily rations served out to the German soldiers in France during the month of August, 1870, contained

	Proteids.	Fats.	Carbohydrates.
Army dietary.	157 gms.	285 gms.	331 gms.

It was represented by one pound, ten ounces of bread, about one and one-eighth pounds of meat, and over one-half pound of bacon besides an allowance of coffee, tobacco and wine or beer. Prof. Ranke has called this an admirable diet for fighting men. In garrison life these soldiers would have received only fifty-six grams of fat, and 120 grams of proteids while the carbohydrates would have been increased to 500 grams or more.

On the other hand, fat when coupled with enough carbohydrate food can replace some of the proteid, and often does so in the food of hardy and economical people. The Bavarian woodchopper is enabled by his splendid digestion to arrange his diet in the following way: He takes little proteid from the animal kingdom, but in order to get enough of it from vegetable products, he must, as we know, take in an immense quantity of the

Diet of Bavarian woodchopper.

starch associated with it, and to this he adds a great quantity of fat. Von Liebig says that such a man takes on the average

Proteids.	Fats.	Carbohydrates.
112 gms.	309 gms.	691 gms.

We see therefore that we can have a sliding scale for fat; that while we should not go below two ounces a day, we may, in case we lower one or both of the other two great constituents, go up to eight or nine ounces.

Importance of fat not realized.

People belonging to the well-to-do classes, unless they have given special study to the subject, seldom realize the importance of fat in our economy. Fat means to them fat meat, suet, lard and the like, and the much eating of these is considered proof of a gross appetite; they do not consider how much fat they take in eggs, in milk, in grains like oatmeal and maize, in the seasoning of their varied dishes, and in their well-fattened meats, where, as in an average piece from a very fat mutton, they eat twice as much fat as proteid without knowing it.

Indeed, a well fed man of the upper classes may have more fat in his daily diet than has the freshly arrived Mechlenburg laborer who spreads a quarter inch layer of lard on his bread. The latter cannot take his fat in unsuspected forms; he craves this principle with his plain vegetable diet, and must take it as he can get it.

Now let us understand that where economy is to be considered, this question of fat does not take care of itself as it does for the rich man. The economical housewife should always keep in mind that she must furnish her family enough fat, and furnish it cheaply.

Substitutes for butter.

Butter is a dear fat; count out the water in it and see what it costs you. We must economize in butter in as many ways as possible. We must eat more fat meat, first, that which is ingrained with the lean where it takes the place of water, as we have seen under "Proteids," costing us practically nothing; when we eat our vegetables seasoned with such a piece of meat, we find them sufficiently seasoned. We must also eat more of fat meat which we recognize as such, taking pains to cook it so that it will be palatable; the crisp, brown outside of a roast is always welcome, but the fat of boiled beef or mutton will also be relished if served very hot. An excellent selection in low-priced beef, is the fat middle rib; the lean part is very tender and juicy when cooked in water at a low temperature for two or three hours (or in Heat Saver, see page 194, for three or four hours) and the

fat, if served hot, any but a pampered taste will relish. Too much cannot be said in praise of pork as furnishing a good tasting and cheap fat; it can be cooked in many ways and used to flavor vegetables, etc.

Digestibility of fat.

It is consoling to the economist to know that little of this food principle will be wasted in the body. Fat is more completely absorbed, according to the testimony of the experimenters, than any other kind of food, even meat.

We want to say a few words as to the character of different animal fats, and then we are done with this subject.

All the fats consumed by us, without exception, are composed of three bodies called neutral fats, mixed together in varying proportions. These three bodies are "olein," "palmatin" (margarin), and "stearin," and the chief difference between them is that they melt at different temperatures; the more olein a fat has, the more easily it melts, and the less it has, the more it is like tallow. In vegetable oils, we find in addition to these, small quantities of what are called "fatty acids," and in butter we have beside the three common fats, a small per cent of four scarcer ones.

Fats compared.

Practically therefore, all fats are alike, and when absorbed they do the same work in the body, their varying flavors and their colors having nothing to do with this.

However, their flavor, their appearance and the ease with which they melt in the mouth and in the digestive tract have much to do with our estimation of them as foods. Mutton fat will do our body the same service as butter, but because of the relatively small amount of olein it contains, we have difficulty in swallowing it.

As to the comparative digestibility of these fats, it is generally admitted that those which melt at a low temperature, like butter and vegetable oils, are most readily taken up by the system; it is thought that we could digest beeswax if it would melt in the stomach. Still, although butter stands in common estimation as the most digestible, as it is the most palatable of the fats, the stomach finds no trouble in disposing of reasonable amounts of any fat used in the household.

Artificial butter.

The fact that all fats are so similar in composition, and that, if once digested, they will do the same service in the body, first led scientists to try to make out of the cheaper fats a substitute for butter. It was Napoleon III who set the chemist Mège-Mourier at work to discover an artificial butter for

use in the army. This chemist added butter color and flavors made in the laboratory, to olein and margarin extracted from beef suet, and mixed with this a little real butter, and so successful was the result, that the making of artificial butter has become a great industry. Now certainly no one objects to artificial butter on the ground that it is made of animal fats, for he eats these every day on his table; he objects because he has doubts as to the cleanliness or the healthfulness of its method of manufacture.

Therefore since the substitution, to some extent, of animal fats for butter is from an economic standpoint so desirable, if we cannot bring ourselves to use oleomargarine we must do the best we can in these kitchen laboratories of ours to make other fats than butter acceptable to the taste.

USES OF FATS.

Beef suet. Its uses.

Beef suet has many uses It should be bought perfectly fresh, that surrounding the kidneys being chosen as of the best quality. Chopped fine, it is used in suet puddings, and may be employed to enrich other puddings made of skim milk, as a rice pudding; it combines well with bread crumbs in any hot dish, in bread puddings, bread stuffing, bread omelet and soup balls. In all cases it must be chopped fine and cooked sufficiently to fully incorporate it with the other materials. Suet may also be used in many flour dishes instead of butter, if they are only cooked long enough and eaten warm, also in all cake where molasses and spices or any strong flavor is used.

Marrow.

Every bit of marrow in bones should be scraped out and carefully used Its taste is more delicate than that of suet, and it can be substituted for butter even in fine cake.

Butter tried out.

Whatever butter you use in cooking should be *cooked* butter which may be prepared when butter is cheap and put away for winter use. So prepared it will keep as long as lard.

A second quality of butter may be used for this, or that which is beginning to be rancid; if already so. add one-fourth teaspoon soda to each pound, but such butter when tried out will not keep as long as that made from sweet butter. In trying out butter great care must be taken not to burn it. Put it in a large iron kettle and cook it down very slowly until you no longer hear the sound of boiling: it will then begin to froth and rise and this is a sure sign that the process is completed. Set the kettle back to cool a few moments,

then skim and pour off the butter from the dregs into jars. Keep in a cool place and closely covered. In any recipe use one-fourth less than of fresh butter.

Tried out suet. This should be done with even more care, to avoid the tallowy flavor. Exact directions are given in "Cooking Methods," page 192. The "scraps" are often relished by children.

This beef fat (which we decline to call tallow) should be put away in cakes in a jar closely covered.

To use. To use it, scrape it fine, sprinkling a little flour in it to keep it light. So prepared it may be used in any of the ways mentioned under "suet," and to this list still others may be added, since it does not need, as does suet, long cooking in order to mix it well with the other ingredients of the dish. It can be used successfully in warm breads of all kinds, and in all but the nicest cakes if mixed with one-half butter.

Lard. Much of the lard now furnished is so poor, that unless one pays a high price to a well known dealer, it is better for each housekeeper to buy the leaf lard and try it out herself.

Cut fine and cook all the water out, taking care not to burn.

The "scraps" are even better than those left from suet and should by no means be thrown away.

SAUCES FOR MEAT AND VEGETABLES.

The economical and busy housewife says she has no time nor money for sauces, but the fact is she cannot afford to do without them.

All vegetables must have some fat to season them and to use butter in every case is extravagant and gives no variety, while a cheaper fat if made into a sauce with flour and water, can be flavored in a dozen ways.

DRAWN BUTTER SAUCES.

Drawn butter, which is the foundation of most of the sauces is thus made.

Plain. A heaping tablespoon of butter or beef fat is put into a saucepan; when it boils, 1 heaping tablespoon flour

is added and stirred as it cooks. To this add gradually 1 pint of water, 1 teaspoon salt and ¼ teaspoon of pepper. If you wish to unite economy and good flavor use ½ tablespoon of beef fat in making the sauce, and add ½ tablespoon butter, cut in little pieces, just before serving.

Milk sauce is the same, made with milk instead of water.

In *brown sauce*, the fat and flour are stirred till they brown, then make as above.

Any number of sauces can be made from these three by adding different flavors; chopped pickles and a tablespoon vinegar are added to No. 1 when it is to be used on fish; or mustard for mustard sauce.

The addition of eggs raw or cooked makes another variety.

Milk gravies. With the help of milk we can make a gravy as in "milk sauce," with beef or pork fat, seasoning with salt and pepper and perhaps some powdered herb.

Children like all these gravies, if nicely made and flavored, to eat on bread as well as on vegetables.

MEAT SAUCES.

A few cheap sauces for meats alone deserve special mention.

Mint sauce. Two tablespoons green mint or spearmint chopped, 1 tablespoon sugar, ½ cup vinegar. Mix and let stand an hour or two.

Tomato sauce. Boil 1 pint fresh or canned tomatoes with a little onion, salt, and herb flavoring until quite thick, then strain and add 1 teaspoonful of flour cooked in a teaspoonful of butter.

Fruit sauce. Any sour fruit, as apples or plums, makes an excellent sauce to eat with meat. Apple sauce goes especially well with pork.

Horseradish sauce. Add to drawn butter or any meat gravy ½ cup grated horseradish. Simmer a few minutes.

CARBOHYDRATE-CONTAINING FOODS AND THEIR PREPARATION.

We are now to furnish for the body the third great food principle, the carbohydrates. These we mean when we speak of the starches and sugars, and with unimportant exceptions, they are furnished by the vegetable world only.

Cellulose.

As we have seen, that troublesome body, cellulose, plays here a large rôle. It is the skeleton, so to speak, of plants, built by them out of sugar and starch; the chemist finds no difficulty in his laboratory in turning it back into dextrin and sugar, and our stomachs too can digest a large part of the cellulose of very young and tender plants,—from forty-seven per cent to sixty-two per cent it has been found, of young lettuce, celery, cabbage and carrots,—but in older plants, the cellulose proper becomes all intergrown and encrusted with substances of a woody and mineral nature, from which even the chemist separates it with the greatest difficulty, while our digestive juices are entirely unequal to the task. Therefore it is that the whole art of the cook is needed in treating this substance; she must soften it, she must break it up, and in many cases separate it as completely as possible from the sugars, starches and proteids which it hinders us from appropriating to our use.

Its use.

In some cases, as in oatmeal and graham flour, we leave the cellulose because of its mechanical action on the bowels. To be sure, this is a wasteful process, for the cellulose carries with it when it leaves the body considerable undigested food, but better this waste than to give the muscles of our intestines so little work to do that they become unable to digest any but fine, condensed foods.

As a rule, however, we must think of cellulose not as a food at all, but as a tough, foreign body which we must reckon with before we can utilize the proteid and starch particles of many important vegetable foods.

Amount of Carbohydrate.

The carbohydrates, especially the starches, are the cheapest of the food constituents and therefore most

apt to be in excess, especially in the food of the poor
to estimates already given, an adult at average hai
along nicely with one and one-eighth pounds of carbol
rial (meaning, of course, the dry amount of this or
though fortunately, as mentioned under "Fats," it i
some of this large amount can be exchanged for fat,
for any reason can better use the latter. Brainwor
richer classes the world over take less of carbohydrate
their starch form, and more proteids and fats.

Inasmuch as we get these carbohydrates from t
kingdom, and because the housewife must furnish th
with other principles as in bread and other things m
and in various dishes in which vegetables are combine
milk, eggs, etc., we will cease speaking of carbohydı
and will give a few hints as to how to prepare vegeta
that we can get the most out of them, bearing in mi
what has been said about not following out this pri
extent of weakening the bowels.

To what extent digested. This leads us, first, to examine the ge
bility of the whole class of vegetable foo
by this, not the rapidity nor the ease, but the *extent*
nutritive principle is yielded up to us. It has been f
usually prepared, vegetable foods give up to us from
one-half less of their nutrients than do animal foods, a
is this true of those that are rich in proteids. To
workman eats as part of his dinner a dish of boile
though he rightly considers that he has been eating
dish, he has really absorbed only sixty per cent of the
substances contained in it, the other forty per cent
him unused because of its intimate connection with t
at least this was the case with Prof. Strümpell who
result of personal experiments on the digestibility of l
whole. Now this workman digested of the meat part
ninety-seven and one-half per cent, and this compariso
the tougher kinds of cellulose interfere with the abso
food matters which they enclose.

The starch part of vegetable food we seem to get ou
than the proteid part, even with our ordinary methods
thus out of cooked rice we get almost ninety-nine pe
starch, but only eighty per cent of what proteid it co

in the form of noodles and macaroni yields up ninety-eight and one-half per cent of its starch and eighty per cent of its albumen—in the form of bread a little less of each. The potato will give us only seventy-five per cent of what little proteid it contains, but as high as ninety-two and one-half per cent of its starch.

Effect of too much starch in the diet.

Although the starch-containing foods are cheap and although they yield up a good per cent of this nutritive principle, they must not be used to excess for the following reason. Starch must first be turned into sugar by our digestive juices before it can be taken up into the blood, and if the stomach is given more at a time than it can master, certain fermentations may take place, and digestion be influenced. The best authorities say that without doubt the continued and severe diarrhœas of small children are due to the fermentation of starch foods for which their digestive organs are not yet ready.

These fermentations, the irritating action on the bowels of too much cellulose. and the loss of a good deal of proteid substance connected with it form the shady side of a vegetable diet. Even the ox with his many stomachs gets out of grass and unchopped hay only sixty per cent of the proteid and fifty per cent of the fat contained in it.

VEGETABLE PROTEIDS.

Even in our part of the world two-thirds of the proteid food of most people is taken from the vegetable kingdom, and in order to choose our food profitably, we must know where to look for vegetable proteids, and how to fit them for eating. Here the cereals and the legumes are our friends, the former furnishing from seven to fourteen per cent in their dried state, the latter giving the astonishing figure of twenty to twenty-four per cent; or as much as meat.

GRAINS.

The cereals or grains, though containing much less proteid than the legumes, are more valuable to us because of their excellent taste, their availability to the cook and the readiness with which when ground they yield us their nutrients.

Since the grains are such important foods, a table is appended showing the average richness in food principles of those in common use among us. We find that different analyses of the same grain differ greatly from one other, barley for instance, ranging from 8

to 18 per cent in its proteid, and this may account for a certain grain being popular in one country and not in another.

In our country we are especially fortunate in the cheapness and excellence of at least two of the grains, Wheat and Indian corn.

Wheat and Indian corn.

The first has of course much higher food value, but the latter is so cheap and can be so easily cooked that it is a blessing to the poor. The large per cent of both proteids and fat

Oats.

in oats is to be noted, justifying as it does, the high esteem in which they are now held among us. At the

Rice.

other extreme is rice, the poorest of the grains in both these principles, but its almost perfect digestibility renders it very useful.

Analysis of grains.	Proteids.	Fats.	Carbohydrates.	Water.	Cellulose.
Fine wheat flour,	10. per ct.	1.0 per ct.	75.2 per ct.	13. per ct.	0.3 per ct.
Rye flour,	11.5 "	2. "	69.5 "	14. "	1.5 "
Barley grits,	11. "	1.5 "	71.5 "	15. "	0.5 "
Oat grits,	14.5 "	6.0 "	65. "	10. "	2.5 "
Buckwheat flour,	9.5 "	2. "	72.5 "	14. "	1. "
Corn or maize flour,	10.15 "	4.80 "	68.45 "	14. "	2.6 "
Rice grains,	8. "	1. "	76.5 "	13. "	0.5 "

SUGARS.

Most people would class sugar among the luxuries, and indeed we are best acquainted with it in those combinations with fruit, eggs, butter, and various flavoring matters, which, as puddings, pies, cakes, custards, etc, make up our dessert list.

Food value.

Our first concern, however, is with its food value. It gives us the high figure of ninety-nine per cent of the third food principle,—Carbohydrates. That is, it must be put in the list with bread and it can be used to a certain extent instead of bread and other starch foods. Moreover, it is especially fitted for a food in cases where nourishment is needed immediately, as it is digested or absorbed into the system almost as quickly as water and without taxing the digestive organs, and perhaps on this account is its consumption so great in our country; we live fast and we want our nutriment in a condensed form.

But on account of its cost and because we are able to take only a moderate amount at a time, sugar cannot, to any great extent, take the place of the starches; we are to value it chiefly for the relish it

Its chief value.

gives to other foods. As a flavor, it is of the greatest value, but if we prize variety we are certainly accustomed to the taste of sugar in too many dishes, as in rice, custards, and various egg and bread dishes, which the foreigner would sometimes salt instead of sweeten, and eat with his meat instead of at the end of the meal.

We would suggest that when we do use sugar, as in a pudding, for instance, that we use less of it than we are accustomed to do, for in that case we could eat enough of a dish so flavored to make it furnish more of the real substance of a meal.

BEANS, PEAS AND LENTILS.

Per cent of proteids.

Look again at the remarkable per cent of proteid given by this class of vegetables. Beans and peas, twenty-three per cent, lentils, twenty-five per cent, while beef gives on the average only from seventeen to twenty-one per cent. By people who from choice or necessity live principally on vegetables, the legumes have always been largely used; their consumption is extensive in India, China, and in all of Europe.

To be sure, the *quality* of the proteid is not the same as in meat, it is less stimulating and palatable, and perhaps in other ways inferior, but the proteid needs of the body can be answered by it, and that is a very important item when the question is one of economy.

Digestibility.

The impression that dried beans and peas are "hearty" food, fitted for out-door workers rather than for less vigorous people or those of sedentary habits, seems justified by the fact that these vegetables contain an unusually large per cent of

Cellulose.

cellulose of the tougher sort which requires a long continued application of heat to free it from the proteid and starch of the vegetable; indeed, unless it is broken fine or ground into flour, cooking, however long continued, will be insufficient. We have seen that Prof. Strümpell digested only forty per cent of the proteid of beans cooked in the ordinary way, but when they were ground to flour and baked he digested 91.8 per cent.

Bean flour.

The fact is, we could cook and eat our wheat whole much more easily than we can our beans, and yet bean flour is not in the market, if we except the "prepared" sort in small, expensive packages. It seems that the best we can do is to cook beans well and seive them; in that way we free them from the skins at least.

Split pea. The dried and split pea, though as valuable as the bean and already freed from the skin, is not as much used among us; it should be more employed in soups and as a vegetable.

Lentils a few years ago were to be found only in large cities; now they are more easily attainable. Their food value, as we have seen, is still greater than that of beans and peas, but the taste is not as agreeable until one becomes accustomed to it. An economist cannot afford to neglect the legume family.

POTATOES.

We in our country need not feel as bitter against the potato as do the scientists of Europe, for we are not obliged to use it to excess, and considering its cheapness and availability it is for us a good vegetable and on these accounts, though it makes a poor enough showing as to food value, we must rank it next to the bean in importance. It has only 2 per cent of proteids, no fat and only 20.7 per cent carbohydrates, and yet since it can be prepared in so many ways and we never tire of its mild flavor, it will doubtless continue to come upon our tables more frequently than any other vegetable. But every day or twice a day, in large amounts, is far too often; indeed those who use it to this extent must be ignorant of its relatively low food value. The quality of the potato is of great importance and none but the best should be used. It should be a mealy variety and perfectly ripe.

GARDEN VEGETABLES.

Green vegetables, excepting the pea and bean, are not to be valued chiefly for what we can reckon up in them of proteids, fats and carbohydrates, for the amount is very small. Except in the height of the season they must be looked on as luxuries, but we will buy them as often as we can afford them. In quantities sufficient to flavor soups and stews they can always be afforded, and in this way should be freely used, carrots, celery, parsnips, and tomatoes, for example.

FRUITS.

Our markets offer us a great variety of fine fruits, and many of them are cheap in their season; apples in the fall are within the reach of the very poorest.

Fresh fruits have a large per cent of water, as high as 89 per cent in the orange, and few fruits have less than 80 per cent. Their food value is mainly in the form of sugar, apples giving us on an average 7.7 per cent, grapes 14.3 per cent; of proteids, the amount does not, with the single exception of the strawberry, reach 1 per cent; but fruits are very useful to us on account of their flavor, due to various aromatic bodies, fruit acids and sugar. The apple is especially valuable on account of its cheapness and fine keeping qualities, and is used in a variety of ways by the cook to give a relish to plain materials. Although our largest use of them is in sweet dishes, they are perhaps quite as valuable used without sugar; they may be fried in slices and eaten with fat meat, as bacon or sausage, or they may be used to stuff a fowl.

Fruit is not for all people easy of digestion if eaten in considerable quantities, and this is partly on account of its relatively large per cent of woody fibre, and also, especially when not quite ripe, because of the acids and pectose contained in them. Huckleberries have twelve per cent woody fibre, apples only 2 per cent including the seeds and skin.

The importance of dried fruits as food is not well enough understood. Fruit loses in drying a large portion of its water, leaving its nutritive parts in more condensed form for our use; dried apples are very near to bread in the per cent of nutrients they offer, and the dried pear may be called the date of Germany, so general is its use. With us this fruit is too expensive, but in parts of Germany the writer has seen dried pears commonly exposed for sale by the barrel like beans; they are eaten in great quantities by the common people, who seem to digest them and dried apples without any trouble, accustomed as their stomachs are to a rye bread and vegetable diet. These dried fruits are made into a variety of dishes with meats, with potatoes and with beans and also with noodles and macaroni.

COOKING OF GRAINS.

The grains may be cooked whole, coarsely ground, as grits, and finely ground, as flour.

Grains cooked whole.

All these grains can be cooked whole but it is seldom done, because of the length of time required. Only rice and barley are generally so cooked.

Rice. To cook.

In cooking rice, the aim should be to have the grains distinct from each other, soft, dry and mealy.

Steamed. This is the best way. Add to the rice three times its bulk of water, salt well, put in a covered dish in a steamer and steam one-half hour. Or, the rice may be soaked over night, and it will then steam soft in twenty minutes.

Boiled. Put the rice into a large quantity of boiling water, add one teaspoon salt to each cupful of rice; boil fast, stirring occasionally. Drain, dry out a little and keep warm by covering with a cloth, as is done with potatoes. Save the water poured off for soup.

Rice. To use. Its best use is as a vegetable with meat. Being of a bland and neutral character, it can, like bread, be made into an endless number of dishes to be eaten with meats, or into dessert dishes, with sugar, fruits, etc. For rice omelette (see page 206), rice pudding (see "Index" for pages).

Grated cheese is a good addition to rice, supplying its lack of proteids and fat.

Pearl barley boiled. Soak all night and boil soft in salted water. It may also be steamed. Use as a thickening for soups, or like rice, as a vegetable, or as a breakfast dish with sugar and milk.

With prunes. It is excellent mixed with its bulk of stewed prunes;—pour over it melted butter, sugar and cinnamon.

GRAINS, COARSELY GROUND, OR GRITS.

These are better adapted to simple cookery than are fine flours, since to make them eatable it is only necessary to cook them soft in water. The grains used in this way among us are cracked wheat, farina or wheat grits, oatmeal, hominy and corn meal, and they are all cooked in nearly the same way.

MUSHES.

Wheat, oat and corn mushes. *Time* 2–3 hours. This time may be shortened by soaking the grits some hours in water Oatmeal and corn cannot be over-cooked.

Amount of water. They all, except corn, absorb from three to four times their bulk of water; corn, a little over twice.

Salt. One teaspoonful to one cupful of grits.

Method of cooking. Steaming is best, as there is then no danger of burning or of making the mush pasty by stirring. Put the grits and four times their bulk of water into a double boiler or into a dish and set the dish into a steamer, or use a tin pail with tight

cover, and set in a kettle of water;—any way to keep it at boiling heat without burning.

Uses for cold mushes.

Porridge. Stir any cold cooked mush smooth with half water and half milk to the consistency of porridge. Add a little salt and boil up. Sugar and cinnamon or nutmeg may be added as flavor. Of course porridges can be also made of the uncooked grits, they are simply very thin mushes.

Pancakes. One cup of cold oatmeal, hominy or corn mush, 2 cups flour, ½ pint of milk, ½ teaspoon salt, and 1 egg, 2 teaspoons baking powder or 1 of soda and 2 of cream of tartar. Or, sour milk may be used with 1 teaspoon soda, omitting the cream of tartar. These mushes will differ a little in thickness, and therefore more or less flour may be needed. Bake on griddle.

Muffins. The same mixture as above, with the addition of a little more flour. Bake in muffin rings.

To fry. For this, only corn mush and hominy are commonly used. When cooking, add a handful of wheat flour to the mush to make it stiffer. Pack while warm into a square mould and when cold cut in slices and fry slowly to a nice brown on a griddle with a little fat. Or the slices may be dipped into beaten egg, then into bread crumbs, and fried in boiling fat.

CORN FLOUR.

There is one fine flour that can be treated in the same way as the coarsely ground,—that made from Indian corn. Perhaps on account of its larger per cent of fat and because little of its albumen is in the form of gluten, it does not form into a sticky paste as does wheat flour, but can be mixed with water only and then boiled or baked into digestible and good tasting food, and this is one thing that makes corn so valuable a grain to people like the negroes of the southern states, whose cooking apparatus is of the most primitive sort. Corn meal has one peculiarity,—it quickly sours and should be kept no longer than a week. The kiln-dried meal, however, keeps indefinitely, and is now largely used, but is not as sweet as the freshly ground. The name "meal" seems to be used for both the fine and coarsely ground

Corn mush.

This, whether made from fine or coarsely ground corn, is cooked like grits. See page 222.

Hoe cake or corn pone.

One quart Indian meal, one teaspoon salt. Moisten to a dough with boiling water or milk; let it stand a

few hours till it shows air bubbles on the surface, then make into thick cakes and bake in the oven, or cut in slices and fry in pork fat on a griddle. Break, not cut, and eat hot.

GRAHAM FLOUR.

This preparation of wheat, though finely ground, may be treated somewhat like grits, and a bread may be made of it with the addition of water only which will be light and palatable. The secret of success is in having the oven very hot

Graham gems. Mix salted graham flour with cold water to a batter thick enough to drop, then put it into iron forms already heated, and bake in a *very* hot oven for about fifteen minutes.

FINE WHEAT FLOUR.

Flour may be cooked, of course, in boiling water or milk, and in this way is used to thicken gravies or soups, and also to make a sort of mush with milk and eggs. See "Minute Pudding"

The principle of cooking it in this case differs not at all from the cooking of a potato; in both cases the starch granules soak up the hot water till they burst their cellulose walls. But if we were to try to *bake* flour when wet up into a thick paste, we would find it, in the first place, difficult to accomplish, the heat being very slowly communicated from the surface to the interior, and when done, we would have only a tough indigestible mass. There is, however, one way of preparing such a paste for cooking, which we will consider before treating the "raising" of flour for bread. Flour dough is in this case kneaded hard, rolled thin and then dried. So treated we know it in the form of

MACARONI AND NOODLES.

Macaroni. A trade article extensively used abroad where the best kinds cost only ten to twelve cents a pound, and the broken or imperfect sticks not more than seven. It is a valuable article of food, but its use will not become extensive among us while it is so dear.

Like the fine flour of which it is principally composed it is deficient in fat, and must be eaten with the addition of butter, cheese or milk.

How cooked. Put into plenty of salted boiling water, and boil twenty or thirty minutes, till it is perfectly tender (if old it takes

longer to cook). Drain carefully, pouring it into a cullender or lifting out with a skimmer.

To use. 1st. (Best.) Put it in the dish in layers with grated cheese and butter.

2d. Serve with milk and butter sauce.

3d. Add two beaten eggs to the milk and butter sauce.

Other uses. Like bread and rice, macaroni when cooked is made into a great number of dishes; it is added to soups, it is mixed with meat in ragouts, and it is cooked with certain vegetables, as tomatoes.

With tomatoes. Arrange the macaroni in a pudding dish in layers with grated cheese and stewed tomatoes. Brown in the oven.

Noodles. This is also a trade article, but that of home manufacture is much better. It may be called one of the German national dishes, so extensive is its use among that people, with whom it often constitutes the main dish of a meal without meat.

Ingredients. Three eggs, 3 tablespoons milk or water, 1 teaspoon salt, and floor.

To make. Make a hole in the middle of the flour, put in the other ingredients and work to a stiff dough, then cut in four strips, knead each till fine grained, roll out as thin as possible and lay the sheet out to dry. When all are rolled begin with the first, cut it into four equal pieces, lay the pieces together and shave off very fine as you would cabbage, pick the shavings apart with floured hands and let them dry a little.

To use. Boil them a few at a time in salted water taking them out with a skimmer and keeping them warm. Strew over them bread crumbs fried in butter or use like macaroni.

These noodles will keep indefinitely when dried hard, therefore when eggs are cheap they may be made and laid up for the winter. The water in which they are boiled is the basis of noodle soup; it needs only the addition of a little butter, a tablespoonful of chopped parsley and a few of the cooked noodles.

Experimenters have proved that flour in the form of noodles and macaroni is more perfectly digested than even in bread.

BREAD MAKING.

Principles Involved. So far we have used in the cooking of flour no other principle than the simple application of water and heat.

We must now consider how fine flour is to be made into what is known as bread. As before said, the particles easily pack together when wet into a pasty dough which, if so baked, would defy mastication and digestion. We must contrive in some way to separate these flour particles by forcing between them air or some other gas, so as to present as large a surface as possible to the action of the digestive juices and this may be done 1st, By surrounding these particles by fat, as in making pie-crust; 2d, By the air contained in beaten egg; 3d, By forcing carbonic acid gas through the mass by the action of (a) yeast, or (b) of bi-carbonate of soda acting on some acid.

FLOUR RAISED WITH FAT.

Pie-crust.

The familiar example of this method is pie-crust, where a paste of water and flour is repeatedly rolled and spread with some fat, as lard, until the paste is in paper-thick layers with the fat between. When baked, the air expands and separates the flour particles, a true lightness being the result.

So much fat must be employed to produce this result, however, that the use of this method will of course be limited to the construction of dessert dishes, of which not much is eaten at once.

A flour rich in starch is better for this purpose than a gluten flour.

FLOUR RAISED WITH EGG.

The next most simple method of cooking fine flour is to introduce between its particles the air adherent to beaten egg, and by the immediate application of heat to expand the air and stiffen the mass thus aerated. By this method none of the food principle is wasted as when yeast is used, nor is a chemical salt left in the dough as in the action of soda, but the method is expensive and is limited in its use to what may be called fancy breads and cakes.

We have selected the following mixture as the foundation for egg breads; of course others are possible:

Foundation of egg breads.

One quart milk, 3 eggs, 1 tablespoon butter and 1 teaspoon salt.

This mixture is then thickened with any kind of flour, or with part flour and part bread, boiled rice, boiled hominy or corn mush.

To mix. First beat the eggs very light, whites and yolks separately, then the yolks smoothly with the flour and milk, stir the whites in at last very lightly and bake immediately. The eggs must

be beaten *very* light, and the batter just of good pouring consistency, thinner than if no eggs were used

Wheat, graham or corn pancakes

Add to above foundation mixture a scant pint of either of these flours.

Cooked rice, hominy or corn mush pancakes.

Add to the foundation mixture one cup of flour and two cups of boiled rice, hominy or corn mush (or the proportions may be reversed). Bake in small, rather thick cakes. If they stick to the griddle add a little more flour.

Bread pancakes.

Add to the foundation mixture 1 cup flour and 2 cups bread crumbs that have been soaked soft in milk or water and mashed smooth The batter should be rather thick. Bake in small cakes adding more flour if they stick.

Muffins and waffles.

Muffins and waffles of all sorts are made like pancakes, but a little stiffer with flour.

Other egg doughs.

Other egg-raised doughs, mixed in somewhat different proportions and differently cooked, as fritters, sponge cakes and batter puddings, will be found in another section.

FLOUR RAISED WITH CARBONIC ACID GAS.

This is brought about by (*a*) the growth of the yeast plant or by the action (*b*) of bicarbonate of soda on some acid. Both of these methods have their advantages.

Yeast.

The action of the yeast plant when brought into contact with flour and water is to develop carbon dioxide gas and alcohol. This it does at the expense of the little sugar already in the flour, but still more at the expense of that which it manufactures out of the starch, or as some say, out of the gluten. The chemist ascertains this loss of nutritive matter to be as high as one per cent, and Liebig, who was strongly opposed to this method of bread raising, estimated that 40,000 people might be fed on the flour that was wasted in this way in Germany alone. But notwithstanding this waste, the method, on account of its convenience and the good taste it gives to bread, still holds its ground.

The time cannot be far distant when the baker will furnish us better and cheaper bread than we can make in our own kitchens. This has long been the case on the continent of Europe, but for some reason we have not yet reached that point in civilization and the housekeeper must still learn this art and practice it, for good bread is a necessity.

Quality of flour. The best flour is, even for the poor, the cheapest, as it makes more and better bread to the pound. There should always be two kinds kept on hand; the yellowish, high-priced gluten flour for bread making, and the whiter, cheaper sort for pastry, cake and thickenings.

No recipe for making yeast will be given, as the compressed yeast is so much better than the housewife can make, and is now obtainable even in small towns.

To make bread. Proportions, 1 quart warm water, 2½ quarts (about) of flour, 1 tablespoon salt, 1 tablespoon or one cake of compressed yeast, or ½ cup liquid yeast. The proportions of flour and water differ according to the quality of the flour, the gluten flours taking up much more water than the starch flours.

Put the flour and salt into your bread pan and make a hole in the middle, then pour in gradually the water in which the yeast has been dissolved, mixing as you pour with your hand or with a spoon. As soon as the mass will hold together, take it out on a moulding board and with floured hands work it gradually into a tender dough, using as little flour as possible, for the dough must remain as soft as can be handled. This first moulding should take from 15 to 20 minutes. Then let the bread rise in a warm place; the yeast plant can live in a temperature ranging from 30° to 170° F. but thrives best at about 72°. Cover with a cloth and in winter keep by a warm stove If made with compressed yeast, the dough will rise the first time in an hour. Take it at its first lightness, before it begins to sink back (it should be like a honycomb all through, and double or treble its original bulk), put it on your moulding board, or ¼ of it at a time, and mould it well until it is fine and tender again. Add no flour this time but keep the hands moist with warm water or milk or with lard. Divide into loaves—small ones—which should only half fill the greased tins, and set again to rise, keeping it at the same temperature and letting it get very light again. Flour that is rich in gluten requires longer to rise than that containing more starch.

Baking bread. It is difficult to give directions about the heat of the oven. One housekeeper says "hot enough so that you can hold your hand in till you count twelve," another, "until you can count thirty," and the puzzled novice can only inquire "how fast do you count?" The oven must be hot enough to brown the

bread lightly in ten minutes, and to bake a small loaf in from twenty minutes to half an hour.

Additional facts. If more convenient, a bread sponge may be made at first with the water, yeast, and part of the flour, and when light the rest of the flour added. It hastens the process a little.

How many times shall bread rise? Do not let the bread rise more than twice; it loses each time some of its nutritive qualities. Bread raised *once* is coarse of grain but sweet to the taste.

To keep bread long. Mould it harder than you do bread that is to be eaten soon.

Dough that has become chilled. Set the bread pan immediately into a larger one filled with warm water and as the water cools replace with warm until the dough begins to rise again.

Dough raised during the night. This method is often convenient, and does very well if slower yeast is used, but bread is better to be raised quickly with compressed yeast. If the latter is used a forenoon is sufficient for the process of making and baking.

To delay the baking of bread dough. For convenience, as to make warm biscuits for supper, rising dough may be kept at a standstill for hours without injury at a temperature of about 50°, as in a cellar, and an hour before baking brought into a warm room to finish the rising process.

BREADS FROM OTHER FLOURS

Graham bread. Graham bread is made like white bread using two parts graham to one of white flour, or any other proportion liked, but it should be mixed very soft. A little sugar and fat should be added, 1 tablespoon lard or beef fat and 2 tablespoons sugar or molasses. Bake slower and longer than white bread.

The usual and most convenient way of making graham bread is to mix the flour and other ingredients with some of the white sponge on baking day.

Rye bread. Rye bread is made exactly as is bread from wheat flour, but in this country four parts rye, one part corn meal, and a handful of wheat flour are generally used. It must bake much longer—two to three hours in a slow oven It is still better steamed the first two hours and baked the third.

Corn bread. Corn bread is made of 3 parts corn meal to 1 of wheat flour, same quantity of yeast and salt as for white

bread, and an addition of 2 tablespoons lard or beef fat and two tablespoons sugar. It is only to be stirred, not moulded, and need rise but once.

BISCUITS, BUNS, ETC.

Breakfast rolls or biscuits. These are "little breads" of either white or graham flour. Make part of the dough out into little balls which will rise more quickly and bake in a shorter time, a little butter or lard, one tablespoon to a quart of dough being generally moulded with it

When called "Breakfast Rolls" the dough is made out into flat round cakes, the top buttered and folded over not quite in the middle.

Milk rolls. Milk rolls are made from bread dough mixed with milk instead of water; they are very tender and delicate.

Wheat gems or drop biscuits. One modification in the baking of dough is worthy of mention. Use about a cup more milk in mixing the receipt for bread given above, so that the dough will just drop from a spoon and then bake in forms in the oven, or on a slow griddle.

Rusks. These are made from bread dough mixed with milk and with the addition of four eggs and one cup of butter to a quart of milk. Form, long and high.

Other uses for rusk dough. There are many uses for the above dough. When made out into biscuit shape it may be steamed and eaten as a simple pudding with fruit, or made into tiny balls and cooked, when light, in a meat stew, the dish being then called a pot-pie.

Buns, plain. These are like *Rusks* (above) plus 2 cups of sugar and a little spice, say, ½ teaspoon nutmeg. Roll the dough out ½ inch thick, and cut with a biscuit cutter. Let it rise till very light, which will take some time on account of the sugar.

Fruit buns. To plain buns add 1 cup India currants, washed, dried and floured, or raisins cut in bits.

Raised cake. From the recipe for buns, as above, a plain and good cake may be made by using one pint instead of one quart of milk to the given quantity of eggs, butter and sugar, and adding a little more fruit. Bake in a ribbed pudding dish which has been thickly buttered, and in the butter, blanched almonds arranged in rows.

Doughnuts. Bun dough may also be fried in fat, as doughnuts.

For a fine brown crust To give a fine crust to biscuit or buns: Brush over before baking, with a feather dipped in one of these mixtures: one teaspoon of molasses and milk, two teaspoons of sugar and milk, or three teaspoons sugar and the white of an egg.

To show the true relation of the above doughs to each other, the quantity has been kept the same as for bread dough, but one-half the given quantity of cake, buns or biscuit would be enough for a large family.

To steam bread Any of the above doughs can be cooked by steaming instead of baking, when more convenient. They will of course lack the brown crust, but may afterward be dried or browned in the oven. A somewhat longer time is required for steaming than for baking.

YEAST BREADS—THIN.

Raised pan cakes Wheat, graham and corn. The materials for these are, 1 quart milk, or milk and water, a little more than a quart of flour, 1 tablespoon compressed yeast or ½ cup liquid yeast, 1 teaspoon salt, 1 tablespoon butter; the flour may be wheat flour, wheat and graham mixed, or wheat and corn mixed, or part bread crumbs may be mixed with the flour. Make and raise like bread sponge. It is better they should be too thick than too thin, as milk may be added to thin them after they are light, but raw flour added at that time spoils them.

Pancakes with eggs. Add to the above batter just before baking, 1, 2 or 3 eggs, yolks and whites beaten separately. Use in this case somewhat less flour.

Muffins and Waffles. These can be made of either of the above pancake batters, with 1 cup to 1 pint more flour.

BUCKWHEAT FLOUR

Buckwheat flour makes bread that is relished by those accustomed to its somewhat peculiar taste, but in this country it is used only in pancakes.

Buckwheat pancakes. One quart buckwheat flour, 1 teaspoon salt, 1 cup or less of corn meal scalded in a little water, 2 teaspoons molasses (to make them brown—a little buttermilk answers the same purpose), 1 tablespoon compressed yeast, 1 quart warm water, or enough to make a thin batter. Let rise over night.

FLOUR RAISED WITH SODA.

Soda. On the interaction of bicarbonate of soda and different acids, by which carbonic acid gas is liberated is based a common method of raising doughs. It wastes none of the flour, as does yeast, but it has its own disadvantages. The product of these chemicals acting on each other is a salt which is left in the bread; hydrochloric acid acted on by soda gives common salt, to which there could be no objection, but this method is not easily used in the household, and the salts left by other acids, as the lactic acid of milk when acted on by bicarbonate of soda, we get enough of in other dishes. Whether reliable experiments have been made as to the comparative digestibility of breads raised with soda and those raised with yeast the writer does not know, but there is a wide-spread impression that the former should be eaten only occasionally, and it is certain that we tire of them sooner than of yeast breads. Besides, which is of importance to one who must economize in milk, eggs, &c , better materials must be used with soda than with yeast to produce an equally rich tasting bread or cake.

METHODS.

We have three methods of using bicarbonate of soda to raise flour; by its action on

1. The acid contained in sour milk, from 1 to 2 teaspoons of soda being used to a quart of milk.

2. On cream of tartar, the proportions being 1 teaspoon soda to 2 of cream of tartar to a quart of flour.

3. On tartaric or other acids already mixed with it in a baking powder and to be used according to directions on the package, or, one may say in general, that three teaspoons of the powder go to every quart of flour.

Secret of success. The secret of success in making soda raised breads consists in (1) the perfect mixing of the soda and cream of tartar or the baking powder, with the flour, cooks who are particular sieving these ingredients five times. In this connection we cannot urge too strongly that each housewife should make and keep on hand this prepared flour; in a leisure time she can measure, sieve and mix it, and she has then in making biscuit or cake, only to chop in the butter, add the milk and eggs and it is done.

2. In light mixing of the shortening with the flour; this is best accomplished with a chopping knife.

3. In a rapid completion of the work after the two raising agencies have become wet and begun to work, and no delay in baking when all is ready.

Soda biscuits. *Ingredients.* One quart of flour, 1 teaspoon salt, 1 tablespoon butter, or butter and lard, or butter and suet, 1 scant pint *sweet* milk or water with 1 teaspoon soda and two of cream of tartar, or three teaspoons of baking powder; *or*, 1 scant pint *sour* milk with 1 teaspoon soda and one teaspoon cream of tartar; if the milk be very sour omit the cream of tartar.

To make. In a chopping bowl stir all well together except the shortening and milk, then *chop* in the shortening which should be cold and hard, till all is fine and well mixed. Now add the milk a little at a time, still mixing with the chopping knife. Take out on the moulding board and roll out with as little mixing as possible.

This dough is often made richer, even 1 cup of butter to 1 quart of flour being used. but so much as this can only be considered extravagant and unhealthful.

As biscuit. *To use this dough.* Roll 1 inch thick, cut with biscuit cutter and bake. To be eaten warm with butter.

As graham biscuits. Use three parts graham flour to one of wheat and treat in same manner.

As short cake. Roll ½ inch thick, fit into jelly cake tins and bake. When nicely browned, split and butter and pile up like toast.

For fruit short cake (see page 237.)

SODA BREAD OF CORN MEAL.

Corn bread, or Johnny cake. 1. Plain. One cup sweet milk, 1 cup sour or buttermilk, or both of sour milk, 1 teaspoon salt, 1 teaspoon soda, 1 tablespoon butter or suet or lard, 3 cups Indian meal, and 1 of wheat flour, or all of Indian meal. Pour into a tin and bake 40 minutes.

2. Richer. The same with an egg and ½ cup sugar added.

3. Very nice. No. 1, with the addition of 3 eggs, ½ cup sugar and ½ cup butter, 1 cup meal being omitted.

SODA RAISED BREAD—THIN.

Pancakes without Eggs.

1. Of wheat flour. *Ingredients.* One quart flour, 1 teaspoon salt, and 1 scant quart sour milk, with 2 level teaspoons soda and the same of cream of tartar unless the milk is very sour, when omit the cream of tartar. Sweet milk can also be used with 1 teaspoon soda and 2 of cream of tartar, or 3 of baking powder.

To make. Mix the salt and cream of tartar if used, with the flour. Make a hole in the middle and pour in the milk gradually, stirring with a spoon till smooth. Then beat hard for five minutes, or till it is bubbly. Add the soda dissolved in a teaspoon of hot water, and bake immediately on a very hot griddle.

Unless well beaten before the soda is added, these pancakes without eggs are not a success.

If made with sour milk they will be still better, if when mixed (without the soda of course) the batter is left to stand twelve or even twenty-four hours. Just before using add the soda dissolved in a little hot water.

2. Of graham flour. Are made in the same way, 1 part being of white flour and 3 parts graham.

3. Of corn meal. As above, with corn meal instead of graham.

Pancakes with Eggs.

Ingredients. To any of the 3 preceding recipes add 2 or 3 eggs, beating yolks and whites separately.

Muffins and Waffles.

Muffins and waffles of all kinds are the same as pancakes, made a little thicker and with the addition of 1 tablespoon of butter.

Fritters.

For fritters, which should be next in order (see page 240)

USES FOR BREAD.

These are so numerous that the housekeeper need never fear the accumulation of stale bread, if she will only take care of it in time. Every day the bits left from meals and the dry ends of the loaf must be dried hard in the oven and then put away in paper bags. If time allows, pare off the crusts, cut into cuebs and dry separately to add to soups.

To dry bread.

This dried bread will keep for weeks or months—it must simply be kept clean and dry. In any recipe where bread-crumbs are called for, as bread pudding or bread omelet, use this dried bread, laying it first in *cold* water till it is soft, then pressing it dry in a towel and crumbling it lightly with the hand.

Here are a few of the ways in which bread can be used.

USES FOR BREAD IN SLICES.

Toast.

In dry toast, milk toast, and water toast, to be eaten as such and as a foundation for many other dishes.

Fried toast—bread slices soaked in egg and milk, or water, and fried on a griddle with a little fat. (See page 205). Cold milk or water toast may be so used.

Fritters. For bread fritters (see page 240).

Puddings. For bread and butter pudding (see page 239).

Steamed bread. Stale bread may be cut in slices and steamed so as to taste sweet and good. Set the slices up on end in the steamer and steam five or ten minutes, and then dry a little in an oven.

Bread rebaked. Biscuits of all sorts, even when several days old, may be made nearly as good as when fresh, by wetting the tops and setting in a hot oven for about five minutes. A convenient way of having warm biscuits for breakfast.

USES FOR CRUMBS OR DRIED BREAD

Soaked and crumbled as described on page 236 and use in bread dough instead of half the flour.

In bread omelettes (see page 205).

In meat balls for soups and stews (see another page).

In bread dressing. Pour enough hot water on dry bread to soften it and chop it not too fine; season with chopped onion, herbs and suet or tried out fat. The addition of an egg is an improvement. Bake covered, about an hour, then uncover and brown. This mixture may also be used for stuffing a fowl, leg of mutton, &c.; or it may be fried in spoonfuls on a griddle and eaten with a sweet sauce as the simplest form of pancakes.

In bread pancakes (see page 227).

In bread puddings (see pages 237, 238 and 239).

For breading chops, croquettes, &c., that are to be fried in boiling fat

SIMPLE SWEET DISHES.

This department does not pretend to be complete, it simply aims to classify as many of the cheaper kinds as the ordinary family needs. These will generally be used as desserts but there is no reason why the main dish of the meal should not have some sugar in it I remember that in a simple *pension* in Thuringia, Germany, I once ate of a dinner consisting of a soup, a salad and one other dish, which we would call a bread pudding. I was helped bountifully to this main dish of the meal, I ate and was satisfied, for the materials were good and it was well made and delicately baked. The recipe will be found on page 237.

MILK PUDDINGS.

Indian pudding. One quart of milk, ½ cup corn meal, 1 teaspoon salt, ½ cup chopped suet, 1 tablespoon ginger, ½ cup molasses. Bake covered for 3 hours in very slow oven and serve with sweet sauce.

Swelled rice pudding. One quart skim milk or 1 pint full milk and 1 pint water, ½ cup rice, 2 tablespoons sugar, ½ teaspoon salt. Bake slowly 2 hours covered, then uncover and brown. It will be a creamy mass and delicious in taste. Serve without sauce. Raisins may be added.

Minute pudding of wheat or graham flour. *Ingredients.* One quart milk—skim milk with 1 teaspoon butter will do—2 eggs, ¾ pint flour, 1 teaspoon salt. To prevent burning make in double boiler or pail set in a

kettle of boiling water. Mix the flour and egg smooth with part of the milk, heat the remainder to boiling and stir in the egg and flour. Stir till it thickens, then let it swell and cook slowly for 15 minutes. Serve with fruit, or with sugar and milk.

Farina pudding. *Ingredients.* One pint water, 1 pint milk, 1 teaspoon salt, ½ pint farina, 2 eggs. Make as above.

This is excellent cut in slices when cold and fried brown on a griddle. It may also be made without eggs.

Buttermilk pudding. *Ingredients.* One pint fresh buttermilk, 2 tablespoons cream or butter, 1 teaspoon salt, a pinch of soda, and flour for stiff batter. Steam 2 hours, or till it bursts open, or bake in little cups or patties. May be eaten with any fruit sauce or with milk and sugar

FRUIT PUDDINGS WITH SODA BISCUIT DOUGH.

For this dough, see page 233.

Strawberry shortcakes. When baked as short cake, split the cakes and spread between each pair strawberries mashed and sweetened.

Other fruit shortcakes. In the same way make shortcake of berries of any sort, stewed apples, stewed pieplant, lemon or orange tart filling, in short, any filling for a pie, that is ready to eat without further cooking. These should be eaten warm but not hot, and are as good next day, if put in the oven long enough to become again warm and crisp.

Roly poly pudding and apple dumpling. These favorite dishes are but modifications of the fruit shortcake. In the first the dough is made just stiff enough to roll out, covered with apples or berries or other fruit, then rolled up and put to bake in a pan containing a little water.

For apple dumplings, the crust is cut in squares, sliced apples placed in the middle, then the corners gathered up and pinched together. Bake like roly poly pudding, or steam.

Apple pie. If you wish to cook your fruit at the same time with the crust, fill a deep pie plate with fruit, as apples, and cover with the rolled out shortcake. Bake brown, and when done lift the crust, sweeten the fruit, replace the crust, and the "pie" is ready to serve.

Raised biscuit or bun dough (see page 230), can be used in the same way, or still better, yeast pancake mixture (see page 231) in layers with any sort of fruit.

If you will call these fruit shortcakes "pies," and be content therewith, you will save much labor, much expensive material, and set before your family a more healthful dish. No further recipes for pies will be given; a few that are generally classed as such, coming more naturally under the head of puddings.

FRUIT PUDDINGS WITH BREAD.

1. Brown Betty. *Ingredients.* One pint bread crumbs or dry bread moistened, 1 quart chopped sour apples, ½ pint sugar, 2 teaspoons cinnamon, 4 tablespoons butter or suet.

Arrange bread and apples in layers in a pudding dish, beginning and ending with the bread crumbs, seasoning each layer with the sugar and spice and spreading the butter over the top. Cover it till the apples are soft, then uncover to brown.

2. Berry Betty. The same, made with raspberries or blackberries. If not juicy enough, a little water must be added. A pudding may be made in the same way with cherries or any other well flavored fruit.

CUSTARD PUDDINGS.

1. Plain. *Ingredients.* One quart milk, 4 eggs, beaten yolks and whites separately, 4 tablespoons sugar, a grating of nutmeg and a pinch of salt. Bake in a buttered pudding dish till solid, and take from the oven before it curdles.

2. Rice and custard. To above ingredients add ½ cup of rice cooked soft in part of the milk, or in water. Bake ½ to ¾ of an hour, till nicely browned.

This is the foundation for the many varieties of rice puddings. Raisins may be added.

3. Tapioca. 4. Sago. Tapioca and sago puddings are made in the same way, except they must be soaked for two hours in part of the milk or in water.

Indian and custard pudding. To the ingredients for plain custard pudding add 1 pint of corn meal and an extra cup of milk, 1 teaspoon salt, 1 teaspoon ginger, ½ cup sugar, ½ cup chopped beef suet or 2 tablespoonfuls tried out fat. Scald the meal first in the milk and bake the pudding, covered, two hours in slow oven.

BREAD AND CUSTARD PUDDINGS.

1. Bread pudding or "Semmel Geraüsch." One quart boiling milk poured on as much bread—as will absorb it, about 1 pint if hard—4 eggs, ½ teaspoon salt, ½ cup sugar.

The milk and bread are allowed to get cold and the other ingredients well beaten with it, the eggs being beaten separately, and the whites added last. Bake one hour in a buttered dish. Eat without a sauce.

Of course a bread pudding can be made with fewer eggs, but then it will hardly do for the main dish of a meal.

2. Bread pudding (simple). Dried bread soaked soft in cold water and pressed dry in a cloth, milk to make it into a soft mush. Add 1 beaten egg to a pint of the mixture. Bake from half an hour to an hour and eat with sweet sauce.

With raisins. Raisins or currants or fresh fruit, as cherries may be added.

With dried apples. After putting in ½ the pudding mixture, put a thick layer of stewed dried apples mashed and sweetened, and flavored with orange peel or cinnamon.

Bread and butter pudding. A convenient variation on the ordinary bread pudding.

Plain. Spread thin slices of bread with butter, and pour over them a simple custard, viz : 4 eggs to 1 quart of milk, 4 tablespoons sugar, a pinch of salt. Keep pressed down till the custard is absorbed; Bake slowly till firm and brown. Eat with or without sauce.

With fruit. The bread slices may be spread with India currants, or with any kind of fresh or dried cooked fruit, not too juicy.

Individual bread puddings. Cut small round loaves of bread into quarters, or use biscuits. Soak in a mixture of 4 eggs, whites and yolks, beaten separately, and added to 1 pint of milk with a little sugar and nutmeg. When they have absorbed all they will without breaking, drain and bake in a slow oven to a nice brown, spreading a little butter over once or twice at the last. This dish can be made very pretty by putting currants in the holes around the top and sticking in pieces of blanched almonds.

SUET PUDDINGS.

Ingredients. One-half pint beef suet, chopped fine, ½ pint molasses, ½ pint milk, ½ pint raisins or currants, or both. (A part of the fruit may be figs and prunes cut in bits.) One teaspoon salt, one teaspoon soda mixed with the molasses, 1 pint bread crumbs (dry), 1 pint graham flour and 2 eggs. Steam 3 hours or bake 2.

Eat with lemon sauce.

Simple. Use the above recipe, omitting the eggs and using instead of graham flour and bread crumbs 1¾ pint white flour.

To reheat puddings. All the preceding puddings are good reheated. Cut in slices, and warm in the oven, or fry in a little butter in a pan. Sift sugar over and eat with sauce.

PUDDING SAUCE.

One pint water made into a smooth starch with a heaping tablespoon flour. Cook 10 minutes, strain if necessary, sweeten to taste and pour it on 1 tablespoon butter and juice of a lemon or other flavoring. If lemon is not used add 1 tablespoon vinegar.

This can be made richer by using more butter and sugar; stir them to a cream with the flavoring, then add the starch.

FRITTERS.

These are various doughs and batters fried in boiling fat, and eaten warm with sugar or sweet sauce. The hot fat gives a puffy lightness and a delicious crisp crust.

Lard is most generally used, but cooking oil (see page 193) is better, and even beef fat prepared as (see same page) is good. The fat must be smoking hot to prevent its soaking into the dough. For the same reason batters so cooked must contain more egg than if they were to be baked.

Forms. The fritter may be rolled out and cut in shapes, or dropped in spoonfuls, or run through a funnel, being of course, mixed of different consistency for each method. When nicely browned, take out with a wire spoon and lay on brown paper, which will absorb the fat, then sprinkle with sugar and send to table.

Soda raised fritters. *Ingredients.* One pint flour, (½ may be graham) ½ teaspoon salt, 1 teaspoon oil, butter, or lard, 1 egg and

½ pint sour milk with ½ teaspoon soda, or same of sweet milk with ½ teaspoon soda and 1 teaspoon cream of tartar. Beat the egg, white and yolk separately, adding the white last of all.

Drop from a spoon into boiling lard; *or*, omit nearly half the flour and pour through a funnel.

This batter may be also raised with yeast.

Egg raised fritters. These are more crisp and delicate. If liked very light, soda or cream of tartar or baking powder may be added to these also. These batters are thinner than the preceding; they must be well beaten if no soda is used.

1. *Ingredients.* One scant pint of flour, 2 eggs, 1 teaspoon salt, ½ pint milk, 1 teaspoon oil or butter.

Beat the yolks well, then again well with the flour and milk, add the stiffly beaten whites last. Fry in spoonfuls.

2. *Ingredients.* One heaping pint flour, 4 eggs, 1 tablespoon oil or butter, 1 teaspoon salt, about a pint of water, or enough to make the batter a little thicker than for pancakes. Proceed as before.

Additions. One tablespoon of lemon juice may be added to any of the above recipes, or a little nutmeg or cinnamon if liked.

Fruit fritters. Take sour apples, peel, cut out the core neatly and slice round in slices ¼ in. thick. Soak these a few hours in sweetened wine, lemon juice or other flavoring. Dip in either of the above batters and fry. (They are also very good without being soaked in the flavoring.)

Peaches, pine apples and bananas may be used in the same way.

Bread fritters. Trim the crust from sliced bread, cut in nice shapes and soak soft, but not till they break, in a cup of milk to which has been added 1 beaten egg and some flavoring, as cinnamon, lemon, etc. Dip in fritter batter and fry.

COOKING OF VEGETABLES.

The legumes. As we have seen, the food value of the dried bean, pea and lentil, is great, but as usually cooked a large per cent. of it is lost to us.

In the process of cooking, the cellulose part must be broken up, softened, and as much as possible entirely removed. These vegetables, if they cannot be obtained ground, must be soaked in cold water some time before cooking, cooked till very soft and then mashed and sieved. No form of cooking that does not include seiving can be recommended except for very haidy stomachs. See pages 202 and 243.

Potato. This vegetable must also be treated with care. The starch grains of which it is so largely composed swell in the process of cooking, and burst the cellulose walls confining them, but when this stage is reached the potato is too often spoiled by being allowed to absorb steam and become sodden. As soon as tender, boiled potatoes should be drained, dried out a few minutes, then sprinkled with salt, and the kettle covered close with a towel, until they are served. They should then be put into a napkin and sent to the table.

Other vegetables. Other garden vegetables are cooked more or less alike; put into boiling water and kept at a rapid boil until tender, and no longer, the length of time varying for any given vegetable according to the freshness, size and degree of maturity. When done or nearly so, they should be seasoned and served as soon as possible.

Mixed vegetables. A welcome variety in the serving of vegetables can be found in skillful mixture of two or more kinds. A few of these mixtures are green corn and shelled beans or succotash, green corn and tomatoes, green corn with stewed potatoes, potatoes and turnips mashed together, green peas with a quarter as many carrots cut very small, potatoes with same proportion of carrots and seasoned with fried sliced onions poured over.

Vegetables and fruits. There are also mixtures of vegetables and fruits that are very successful, as lentils or beans with a border of stewed prunes.

SOUPS WITHOUT MEAT.

In general. These soups should be largely used by the economical housewife; they are cheap and nutritious, and if carefully made and seasoned, excellent in taste. A large number of recipes are given, from which can be selected what is suited to materials on hand, to amount of time and quantity of fire.

These will be arranged under Vegetable Soups, Flour and Bread Soups, and Cold Soups.

VEGETABLE SOUPS.

If any meat bones are on hand or trimmings of meat not otherwise needed, simmer them from one to two hours in water and use the broth thus obtained instead of water in making any of the following soups.

Most important are those made from the dried bean, pea and lentil, the three pod-covered vegetables. For their nutritive qualities see page 219.

Bean soup. *Ingredients.* One pound beans, 1 onion, 2 tablespoons beef fat, salt and pepper.

Additions, to be made according to taste. One-fourth pound pork, or a ham bone, a pinch of red pepper, or, an hour before serving, different vegetables, as carrots and turnips, chopped and fried.

Soak the beans over night in two quarts water. In the morning pour off, put on fresh water and cook with the onion and fat till very soft, then mash or press through a cullender to remove the skins, and add enough water to make two quarts of somewhat thick soup. Season.

This soup may also be made from cold baked beans. Boil one-half hour, or till they fall to pieces, then strain and season.

Split or dried pea soup. Make like bean soup.

Lentil soup. Make like bean soup.

Green vegetable soups. The water in which vegetables have been cooked should never be thrown away, with the exception of that used for cooking beets, and potatoes boiled without peeling; even cabbage water can be made the basis of a good soup.

General method. Boil the vegetables until very tender, mash or press through a cullender, thin sufficiently and season.

Potato soup. Good and cheap.

Ingredients. Six large potatoes peeled, 1 large onion, 1 heaping teaspoon salt, ¼ teaspoon pepper. For a richer soup add ¼ pound salt pork cut in bits (in this case put in less salt) or add 1 cup of milk or a beaten egg. Chopped celery leaves give a good flavor.

Boil potatoes, onions and salt in a little water, and when very soft mash, then add, a little at a time and stirring to keep it smooth, a quart of hot water and 1 tablespoon beef fat in which 1 tablespoon flour has been cooked; *or* use the fat for frying bread dice, which add at the last minute.

Most cooks fry the sliced onion before putting it in the soup, but the difference in taste is so slight as not to be worth the few minutes extra time, if time is an object.

Green pea soup. This is a delicious soup and very nutritious. Large peas, a little too hard to be used as a vegetable, may be utilized in its manufacture.

Ingredients. One pint shelled peas, 3 pints water, 1 small onion, 1 tablespoon butter or fat, 1 tablespoon flour. Salt and pepper.

Put peas and onion in boiling water and cook ½ an hour to an hour, till very soft. Press through cullender and season.

Pea and tomato soup. Add to above when done, 1 pint stewed tomatoes and a little more seasoning. This is an excellent soup, having the nutrition of the pea and the flavor of the tomato.

Tomato soup. Valuable for its fine flavor, and may be made nutritious also by adding broth, milk or eggs.

Ingredients. One pint tomatoes, 2 pints water, 1 tablespoon fat, 1 tablespoon flour, salt and pepper.

Cook the flour in the fat, add the peeled tomatoes and a very little water. When they have cooked to pieces, mash them against the side of the pot, add the rest of the water and the seasoning.

Tomato soup No. 2. Proceed as above, using instead of half the water, 1 pint of milk, into which ½ teaspoon soda has been stirred

Parsnip soup. *Ingredients.* One pint of parsnips cut in pieces, 3 small potatoes, 3 pints water, or water and milk, salt, pepper and butter.

Cook till the vegetables fall to pieces, mash and add seasoning. If milk can be substituted for part of the water the soup will be improved.

Young vegetable or spring soup. *Ingredients.* One pint chopped onion, carrot, turnips and celery root in about equal parts, 1 tablespoon fat, 1 teaspoon sugar, salt and pepper.

Heat the fat, add sugar, salt and pepper, then stir the vegetables in it till they begin to brown, add 3 pints water and set back to simmer 1 to 2 hours. Serve without straining.

Green corn soup. *Ingredients.* One-half dozen ears green corn, 3 pints water, 1 tablespoon fat and 1 tablespoon flour, salt and pepper, an egg and a cup of milk.

Cut the corn from the cob and boil one hour. Add the flour which has been fried in the fat, season and strain

Dried corn soup. Make as above, using dried corn, soaked over night and boiled 2 hours.

Sorrel soup. An excellent flavor, new to most of us.

Ingredients. One pint sheep's sorrel, light measure (bought in city markets, or gathered in country fields), 1 onion, a few leaves of lettuce and parsley all chopped fine, $\frac{1}{8}$ teaspoon nutmeg, 1 tablespoon fat, 2 tablespoons flour, 3 pints water, 1 or two eggs, 1 cup milk, salt and pepper.

Heat the fat, add the chopped vegetables and sweat or steam for 10 minutes, then add flour and last the boiling water; add the milk just before serving. Serve fried bread with it.

"Hit and miss" soup. To illustrate how all bits can be used, here is a soup actually made from "leavings."

One cup of water drained from macaroni, 1 cup water drained from cabbage, with a few shreds of the cabbage, 2 small bones from roast veal, 1 scant tablespoon boiled rice. Simmer these together with a chopped onion while the rest of the dinner is cooking. thicken with a little flour and serve with fried bread.

FLOUR AND BREAD SOUPS.

Flour soup. *Ingredients.* One tablespoon beef fat, 1 heaping tablespoon flour, 2 sliced onions, 2 pints water, 1 pint milk, 1 cupful of mashed potato, salt and pepper.

Fry the onions in the fat until light brown; remove, pressing out the fat In the same fat now cook the flour till it is yellow, and add, a little at a time, the water. Put back the onions and let it stand awhile, then add milk and potato. Salt well.

The potato may be omitted and a little more flour used.

Browned flour soup. *Ingredients.* One tablespoon butter or fat, $\frac{1}{2}$ cup of flour, 2 pints water, 1 pint milk, 1 teaspoon salt.

Cook the flour brown in the fat over a slow fire or in the oven; add slowly the water and other ingredients. Serve with fried bread.

Browned farina soup. Make like above, but of wheat farina.

Bread soup. *Ingredients.* Dry bread, broken in bits, water, salt and pepper, an onion and a little fat.

Soak the bread in boiling water for a few minutes, add the onion sliced and fried in the fat; salt and pepper well.

Or, use milk instead of water, and toasted or fried bread.

Noodle soup. (See page 225.)

MILK SOUPS OR PORRIDGES.

These are especially good in families where there are children, and would be welcome on almost any supper table. They are almost equally good eaten cold.

In making, use a porcelain kettle or an iron kettle, greasing it first with a little fat, as a scotched taste spoils the dish.

Wheat porridge (salted.) *Ingredients.* Three pints milk, 1 pint of water (or half water and half milk), ½ cup flour, 2 eggs, 2 teaspoons salt.

To the boiling milk and water, add the flour stirred smooth with a little cold milk; let it cook 10 minutes. Beat the eggs in gradually, but do not cook them; serve with fried bread. Grated cheese is an addition to this soup.

Wheat porridge (sweet.) Same as above, but using only a pinch of salt and as flavoring 3 tablespoons sugar and ½ teaspoon cinnamon. The flavor may be varied by using grated lemon peel, nutmeg, vanilla, bitter almonds or 2 fresh peach leaves boiled with the milk.

Of farina. These two porridges are still better made of farina instead of flour.

Barley porridge. Pearl barley is soaked over night in water, and then cooked for 2 hours till soft. During the last hour add milk instead of water, as it dries away. Flavor with salt and butter.

Indian meal porridge. *Ingredients.* One cup meal, 2 quarts water, 1 tablespoon flour, 1 pint milk, salt, and a little ginger (if liked). Boil the meal and water an hour; add flour and salt and boil ½ hour, and add the milk just before serving.

Oatmeal porridge. Make in the same way, using oatmeal instead of flour.

Graham porridge. One cup graham flour to 3 pints milk and water. Cook 15 minutes. This may be varied in flavor like flour porridge.

These three porridges can be made from cold corn, oatmeal or graham mush.

Chocolate soup. *Ingredients.* ¼ pound chocolate, 2½ quarts milk and water, sugar to taste, 1 egg yolk, a little vanilla or cinnamon.

Cook the chocolate soft in a little water and add the rest; when boiling put in the other ingredients and cook the beaten white of an egg in spoonfuls on the top. Serve with fried bread.

Buttermilk soup or "pop." The foreign kitchen has many recipes for this soup quite unknown among us.

Cooking brings out the acid, but once used to that taste, one finds the soup good and wholesome.

Ingredients. To each pint of buttermilk, 1 tablespoon flour and 1 tablespoon butter, a little salt.

Bring gradually to a boil, stirring constantly to prevent curdling, and pour on fried bread.

Varieties. Sugar and cinnamon are often added to this soup; also the yolk and beaten white of 1 egg. It is considered nutritious for the sick.

Another. The Germans often add to this soup small potatoes, and bits of fried bacon. In which case the butter is omitted.

Or to the buttermilk soup when done, is added half the quantity of cooked pears or prunes.

Brewis. To salted boiling milk, put enough bread crumbs (either white or graham) to make a thick smooth porridge.

Sour cream soup. This soup is earnestly recommended for trial, as there are few ways in which such a delicious taste may be given to simple materials.

Ingredients. Three pints water, ½ cup sour cream and the following mixture: ¼ cup milk, ½ cup flour, 1 teaspoon butter, ½ tablespoon salt, 1 teaspoon sugar, 1 egg, 1 tablespoon fluid yeast or ¼ teaspoon compressed yeast. Mix these together into a dough and let it get light, then drop half of it in teaspoonfuls into the boiling water and cream; then thin the rest with water until it will pour, add it to the soup and cook 5 minutes. (Not all the dough may be needed.)

Cider soup. *Ingredients.* One pint cider just beginning to work, 1 pint water, 1 cup milk (boiling), 1 tablespoon flour, a little cinnamon and sugar.

Let cider and water come to a boil, add the flour rubbed smooth, and cook a few minutes; and lastly add the milk. Serve with toast. An egg yolk may be added.

FRUIT SOUPS.

To be eaten Warm or Cold.

These are make of almost any well flavored fruit, cooked soft and mashed, sufficient water added, with a little thickening, sugar and spice. They are especially welcome in summer; may be eaten as a first course, or set aside to be used as a drink during the meal.

Apple soup, No. 1. *Ingredients.* Four cups peeled and quartered apples, cooked to a mush in a little water, 1½ pints water, 1 teaspoon cornstarch, 3 teaspoons sugar, ¼ teaspoon cinnamon, a pinch of salt.

No. 2. A soup plate full apples, 1 cup of rice. Cook soft and rub through a seive, adding a little sugar, cinnamon, lemon peel, and an egg yolk. Thin sufficiently with water.

No. 3. Instead of rice, use in the above recipe bread with the addition of a few India currants.

No. 4. Instead of rice, use oatmeal and cook till soft, or use that already cooked.

Plum soup. Make like apple soup, but if the plums are very sour add a little soda—¼ teaspoon to a quart of soup.

Cherry soup. Made in the same manner.

These soups may also be made of dried plums, prunes or dried sour cherries. Soak the fruit over night.

Soups of pears, etc. If soup is made of a milder fruit, as pears, which are at some seasons so cheap, add a few sour apples or more spice, to give flavor.

ADDITIONS TO SOUPS.

If your soup has not strength enough, milk and eggs may be added if no meat stock is at hand.

How to add eggs. The egg should be beaten, mixed with a little of the soup, then added to the rest, but not boiled. The yolk is better for this purpose than the white.

Meat extract. Liebig's meat extract is very valuable for adding flavor to a soup but it is too expensive for general use.

1. Flour. This may be boiled a few minutes with the soup after being mixed smooth in a little water, or better, cook it in a little butter or melted beef fat before adding to the soup.

2. Bread sponge. On baking day, save a little of the bread sponge, make thin enough to pour, and if you wish, add a beaten egg. Set away half an hour to rise again, and when light pour into the soup.

3. Farina. This preparation of wheat, now sold by the pound at a reasonable price, is most valuable as an addition to soup ; it needs only to be sprinkled in and boiled for a few moments.

4. Potato. Mashed potato mixed smooth with a little milk or grated cold potato may be added to soup to give body.

5. Barley. Add to the soup 1 hour before it is done pearl barley that has been soaked over night.

6. Rice. One-half hour before serving, add to soup 1 tablespoon of rice to a quart of soup.

7. Bread. Bits of bread dried hard in the oven, may be added to the soup just before serving, *or* fry them in the spider in a little beef fat, *or* soak in milk and egg before frying. *Or*, toast bread and cut in squares.

8. Vegetables. Any small vegetables may be added, such as asparagus tops, tiny onions that have been first boiled in another pot, cooked peas, beans, etc. A favorite Russian soup is beef soup, with the addition of beets, cabbage and carrots.

Most important of all additions to soup are those which need a little more time to prepare, but are worth the trouble if the soup is to be the principal part of the dinner. Such are the following :

DUMPLINGS FOR SOUPS AND STEWS.

This word has an unpleasant sound, too suggestive of the heavy and unwholesome balls often served under this name, but there seems to be no other name under which these different preparations can be classed. Their basis is bread and eggs, or flour and eggs.

Bread mentioned here is hard dried bread; it must be softened by soaking in *cold* water (hot water makes it pasty), then press it dry in a cloth and crumble it

Meat balls. Any cooked meat or several different kinds when there is too little of each to be otherwise used, is chopped fine and mixed with as much bread, salted and peppered, a little chopped suet or butter, or better still, marrow, and a chopped onion and some herbs, and to each cup of this mixture allow an egg. Mix lightly, make out into little balls and cook in very gently boiling soup. Try one first to see if it holds together. If not, add a little flour.

Fish balls. Substitute for the meat any cooked fish, chopped fine.

Marrow balls. Two eggs to 1 cup of bread and marrow size of an egg, chopped. Make as above.

Bacon balls. Instead of marrow, add cubes of bacon fried brown.

All these mixtures can also be fried in a pan as an omelette, or baked.

Flour and bread balls. Three cups, half bread, half flour, 1 egg, butter size of an egg, 1 cup milk and water, salt. Soak the bread in the milk and water, and make out into little balls with the other ingredients. Cook, covered, 15 minutes (may also be boiled in salted water and eaten with fruit).

Egg sponge. One egg, 1 teaspoon flour, a little salt. Beat white of egg to foam, mix lightly with the rest and pour on top of the soup. Turn over in a few minutes with a skimmer, and before putting into the turreen, cut it in pieces.

No. 2. One heaping tablespoon flour to 1 egg and the yolk of another, and 1 teaspoon butter. Beat hard and drop in with a teaspoon.

Schwaben Spetzel. One egg, 3 tablespoons milk, nearly ½ cup of flour, salt. Pour through a funnel into soup or into salted water, cook 5 minutes and use to garnish beef.

Biscuit dough balls. An excellent addition to a stew or soup is of biscuit or rusk dough (see page 230) made into balls no larger than a chestnut, and cooked in the stew, or steamed in a cloth above it.

Buttermilk balls. Also the following of buttermilk: 1 cup buttermilk, ½ teaspoon soda, 1 egg, salt, and flour enough to allow of the batter being dropped in spoonfuls.

Macaroni. Cooked macaroni cut in pieces an inch long, is a pleasant addition to soup.

FLAVORS OR SEASONINGS.

Without doubt "hunger is the best sauce," but it is not true, as many think, that a craving for variety is the sign of a pampered and unnatural appetite; even animals, whom we cannot accuse of having "notions," have been known to starve in the experimenter's hands rather than eat a perfectly nutritious food of whose flavor they had wearied, and prisoners become so tired of a too oft repeated dish that they vomit at the sight and smell of it.

What we call flavors may or may not be associated with a real food. Meats are rich in flavors and each fruit has its peculiar taste; then, there are the spices and aromatic herbs which are not parts of a real food, and it is most important that the cook should understand the art of adding these as seasonings to mild tasting foods, so as to make new dishes which shall be both nutritious and appetizing. The bulk of our nourishment must be made up of the flesh of a few animals, and a half-dozen grains and as many garden vegetables, but the skillful cook can make of them, with the help of other flavors, an endless variety of dishes.

An American traveling on the continent of Europe becomes acquainted with many new dishes and tastes, and although not all of them are to his liking, he must conclude that our cookery, compared for instance, with that of the French is very monotonous. To be sure, we have the advantage of the European in that our markets offer us a greater variety of natural foods, especially fruits, each having a flavor of its own, and this fact makes us somewhat more independent of the art of the cook; but still we have need

for every lesson of this sort, and especially is this the case with the poor, who must keep to the cheapest food materials, which are not in themselves rich in flavor.

Spices and other flavors, when not used to excess, stimulate our digestive organs to appropriate more easily the food to which they are added; their agreeable odor starts the digestive juices, both in the mouth and in the stomach, and their flavor acting on the palate has the same effect.

The more common spices and flavors, as the housewife uses these terms, are salt, pepper, mustard, cinnamon and mace, nutmegs, cloves, ginger, caraway and coriander seeds, vanilla, and many volatile oils, such as those contained in the rind of lemons and oranges; and to this list we must add certain vegetables, as the horseradish and various members of the onion family, the caper and nasturtium seeds, and the aromatic herbs.

All these have their use and their abuse. Salt is hardly thought of in this list, so necessary do we consider it, and its use is well enough governed by our palate, though no doubt we over, rather than under salt our foods. Pepper is also in nearly every household used to excess, being added to too many dishes. The pungent mustard should be still more carefully used; but a little of it adds relish to a salad or a meat sauce, and goes especially well with certain vegetables, as beans. Cinnamon, mace and nutmeg, we use principally with sweet dishes, but nutmeg makes a nice variety in certain meat stews and in croquettes, foreign cooks use it far too much to suit our taste. Almost our only use of the caraway and coriander seeds is in cookies; try the former in a potato soup for variety. Ginger seems to go well with Indian meal in a pudding or porridge, and with molasses, wherever used.

To give the uses for onions and for the aromatic herbs would be too long a task. The latter can all be bought in a dried state very cheaply, and they retain their flavor well; one of the most useful, however, parsley, is much better fresh; by all means keep a little box of it growing in a window. Perhaps, after onion, celery is most useful as a flavor for soups and stews, root, stem, leaves and seeds being all valuable.

In the flavoring of soups and stews, it is well to use a number of flavors, letting no one of them be prominent above the others; on the other hand, it is well to have certain favorite dishes seasoned always in the same way; as fresh pork with sage; summer savory in a bread dressing, etc.

DRINKS AT MEALS.

A warm drink at meals is better than a cold one, especially in winter or at any time when we are tired; and the drinking of ice water cannot be too strongly condemned, lowering as it does the temperature of the stomach and so delaying digestion. To furnish warm drinks for each meal, acceptable to the palate, cheap and harmless, is no easy question. Soups or broth once adopted as a part of two meals in the day, as is so frequently seen in Europe, and the problem is half solved; indeed some of the drinks here given are really thin vegetable soups or porridges to which the flavor of salt or of sugar may be given according to taste.

Coffee.

It may be concluded, after comparing authors on the subject, that although coffee somewhat retards digestion and acts as a stimulant to the nervous system, still one or even two cups of moderately strong coffee a day will not harm a healthy person. We may say, therefore, that its use to this extent is a question of expense only.

Java and Mocha coffee in equal parts are considered the best mixture. Rio is much cheaper and of strong, pure flavor. The amount to be used for moderately strong coffee is one tablespoon (ground) to a cup.

Chicory is considered here only as an adulterant, whereas in Europe a very little of it, say one-half teaspoon of the prepared chicory to a cup of ground coffee, is used to improve the flavor.

Next to the quality of the coffee, it is of importance that it should be freshly ground and browned. If you buy it browned, reheat it first before grinding. The easiest and most economical way of making is to grind it very fine and put into a bag made of woven stuff, a white stocking top will do; leave room to swell. Heat this in your coffee pot as hot as you can without burning. Pour on boiling water and keep it hot and close-covered for fifteen or twenty minutes.

Boiling coffee increases its strength, but does not improve its flavor.

Tea.

All authors agree as to the harmfulness of strong tea, taken to excess.

Take great pains in making tea. Use an earthern teapot, and have a tea cozy or a large flannel cloth to wrap it in.

The water used should be between hard and soft, extracting the aroma but not the astringency; in China river water is used. If hard water must be used, remember that boiling increases its hardness and that it should be used as soon as it reaches the boiling point.

Take one teaspoonful of tea to a cup, put it in the teapot and heat in an oven till hot, pour on one cup of water that has just come to a boil, and cover with the tea cozy. Let it stand five minutes, then fill up with the requisite quantity of hot water and serve immediately.

Cocoa and chocolate. These both contain a good deal of nourishment, and as drinks are considered rather heavy. As the various kinds differ very much from each other, they are best prepared according to the recipes found on the packages.

"Cambric tea." Milk, except for children, can hardly be looked upon as a drink, but diluted with hot water, and sweetened, it has already been christened for the children as "cambric tea," and it is no bad drink for their elders.

Gruels. A very thin gruel, slightly sweetened, is a good drink.

Oatmeal gruel. Into a quart of boiling water stir 2 tablespoons oatmeal; boil for an hour or longer, strain through a coarse sieve or a cullender, add a pinch of salt, and a little milk and sugar.

Rice gruel. Wet 1 tablespoon rice flour in a little cold milk, put into 1 quart boiling water, salt slightly and boil till transparent. Flavor with a little lemon peel and sugar.

Cornmeal gruel. One quart boiling water, 3 tablespoons corn meal washed in several waters, ½ teaspoon salt, add ½ cup milk and a little sugar; a pinch of ginger is an improvement.

Barley gruel. Soak pearl or ground barley all night or a few hours in cold water, put into boiling water and cook till very soft. Season like the others.

Sago and tapioca gruel. Can be made in the same way.

All these drinks must be thin and not too highly seasoned.

Corn coffee. Brown common field corn as you would coffee, as brown as you can without burning. Grind coarsely and

steep like coffee. Add milk and sugar, and you will find it a delicious drink.

Cold drinks in summer. Lemonade is too strongly acid for a regular drink at meals, but lemon as a flavor is always welcome.

Irish moss lemonade. Wash a handful of Irish moss in 5 waters, pour over it 2 quarts boiling water and let it stand till cold. Strain, adding more water if necessary and add the juice of 2 lemons and sweeten with lump sugar which you have rubbed on the lemons to obtain the oil in the skin.

Soda cream. One pound sugar, 1 ounce tartaric acid dissolved in a pint of hot water. When cold flavor with lemon zest or extract, and add the beaten white of an egg. When used add 2 tablespoons of it to a glass of water in which you have dissolved ¼ teaspoon soda.

Apple water. Slice juicy sour apples into boiling water and keep warm an hour. Strain and sweeten. All these drinks taste best cooled (but not *too* cold) with ice.

Cider. Sweet cider can be bottled for use and makes a delicious drink. Boil and skim till it is clear—no longer; pour hot into bottles, and seal.

See also vegetable and fruit soups.

COOKERY FOR THE SICK.

It is comparatively easy for your family to live on a small income while all its members are in good health, but you will find your resources all too slender when you must cater for the appetite of an invalid.

At best, sickness is always a severe drain on the limited income, but here, as in every other department of your work, you will find that good sense and ingenuity will often stand you in stead for money.

During a severe illness the food as much as the medicine is under the care of the physician, but when the danger is over and he has left you with only general directions, you will be more than likely in your bewilderment to take the advice of the first neighbor that

drops in, although you may know that neither her judgment nor experience is as good as your own.

Now consider first, what did the doctor mean by saying that the patient must be "built up," and how is the wasted frame to get back the fat and muscle that were burned away in the sickness? Chiefly, as you know, by the digestion of food, the proteids and fats and carbohydrates that we have been talking about, and still another, a real food although so often forgotten, the oxygen of the air.

We have said that we need not concern ourselves about this food, that it would take care of itself; and so it will when we are in a state of health and living as human beings should, for as we walk or work we are fed by the air without knowing it. But the case is quite different with a poor invalid shut up in a sick room, we must bring the fresh air to him with as much care and regularity as we do his jellies and broths.

When we are considering what we shall feed our invalid, we cannot do better than keep to our old classification of proteids, fats and carbohydrates. He must have all these principles but in the most digestible form, for the stomach is feeble like the rest of the body. For this reason the proteids must be furnished mainly from the animal kingdom, butter and cream must supply the fat, and the carbohydrates must bring with them as little as possible of the tough cellulose, and they must be so cooked as to be easily digested.

First, as to the proteids.

Hot milk, given often in small quantities, is much used in the early stages of recovery and is generally better liked if accompanied by a bit of toasted bread or made into a thin gruel.

In the first rank, also, comes soup made of lean beef scraped fine, covered with cold water and allowed to stand for an hour, then brought slowly to scalding heat and kept there for a short time; it is then strained through a coarse sieve, the small brown flakes being allowed to pass. Season only with salt. Or, broil a thick, tender steak, cut it in pieces, and then with a lemon squeezer press out every particle of juice, it may then be diluted and seasoned.

Mutton broth is made like beef soup but should be cooked a longer time. Chicken broth also requires more cooking.

Any of these soups may have a little rice or tapioca cooked with them.

Eggs are an important item in the diet of an invalid, being very nutritious and, if fresh, easily digested; do not use them at all if uncertain of their age.

Eggs may be given raw (see page 204) or soft-boiled (see page 205) or poached in hot water. An egg may be served in many ways and makes always a pretty and attractive dish. In cooking it should never be submitted to a high temperature, as that makes the white part horny and indigestible.

A custard made from an egg and a cup of milk and a half table spoon of sugar may be given early in a convalescence. Or use beef soup or chicken broth instead of the milk, and flavor with a little salt and pepper. These custards should be made in a pail set in a kettle of boiling water, the custard being stirred till it begins to thicken.

Next in order comes cooked meat. Beef is best of all, but let it be juicy and tender and broil or roast it, serving it rare. Probably a broiled mutton chop ranks next, although chicken, because of its delicate flavor will often receive the first choice. An invalid should not touch pork, and should be given veal or lamb only in the form of soup.

As to fats, the system needs them of course, but fat meat should not be given, only butter or better still, cream. The butter must never be melted and soaked into the food, nor made into a sauce.

As to the vegetable part of the diet, much care must be used. In the form of gruel or porridge, it is generally very welcome and gives the fluid part of the meal in a good form. For Indian meal and oatmeal porridge see page 246. Milk may take the place of the water.

Toast is with good reason considered invalid's food, for the process of toasting turns part of the starch of the bread into dextrine which is digested with great ease. Grains may be also browned or roasted. Roast rice as you would coffee, cook as usual and eat with a little cream. Remember that bread for toast must be cut thin and first dried out a little distance from the fire, then brought nearer and browned. You may then serve it as dry toast lightly buttered, or in addition to the butter and a little salt, pour hot water or milk on it just before serving.

Panada of toasted brown bread, white bread or crackers, is made by piling the pieces in a bowl, having sprinkled either salt or sugar

over, and then pouring over enough boiling water to soak them well. It should be kept hot for an hour or more, the pieces then lifted out carefully on a hot saucer and served with a little cream and perhaps more salt or sugar. Nutmeg may be added.

Rice is also a very valuable food for use in sickness, as it does not tax the most delicate digestion.

Macaroni is easily digested and of high food value. It should be boiled in salted hot water till tender and served with a little butter or cream. Or it may be added to a custard and lightly baked.

Barley, thoroughly cooked, is good food for an invalid. Oatmeal must be used with caution until the digestion becomes stronger.

As to vegetables proper, a mealy baked potato is perhaps the first to be introduced into the bill of fare; remove the inside, mash fine and season with a little salt and cream. Beware of potatoes cooked in any other way.

The juice of fruits may be used early as a flavor in drinks, but the pulp must be discarded. A baked apple is safest to begin with, when the time comes to introduce fruit as such into the diet.

As to the serving, use the best china, silver and linen that you have in the house and let exquisite neatness never fail.

Remember that surprises are delightful to a sick person; never let the bill of fare be known before hand, and if you can disguise a well known dish, so much the better. Beaten white of egg is a good fairy and serves you cheaply. Snowy white or made golden brown in the oven, it may top many a dish, concealing at one time a custard, at another a mold of chicken jelly or even a cup of delicate apple sauce.

The process of cooking, if simple, an invalid loves to watch and the sight is often a whet to the appetite. Bring his gruel to him in the form of mush and thin it before his eyes with milk or cream, coddle his egg in a stone ware bowl while he eats another course, and by all means make his tea at the bedside.

BILLS OF FARE.

The following bills of fare are made out for a family of six persons, consisting of a working man, two women, and three children between the ages of six and fifteen, the size of the family and the ages attained being considered sufficiently near the average.

The amount of food and the proportions in which the great food principles are represented approximate to what is demanded by standard dietaries for such a family. For the man of the family we have taken, as has been said, the one proposed by Professor Atwater for an American at average manual labor, for the women and children those proposed by Professor König.

Dietary adopted The amounts represented by them are:

	Proteids.	Fats.	Carbohydrates.
Man	125 gms.	125 gms	400 gms.
2 women (each)	96 "	48 "	400 "
3 children, 6 to 15 yrs. (each)	76 "	44 "	320 "
Sum total is	545 gms.	353 gms.	2210 gms.
Or translated into oz.	19.19 oz.	12.42 oz.	78.03 oz.

In calculating these amounts we have followed almost entirely the analytical tables compiled by Professor König.

Meat is reckoned without bone and moderately fat, and in nearly all the bills of fare the amount of proteids enough exceeds that required by the dietary adopted so that we can afford this loss. Flour is of medium quality, eggs are reckoned without shell, and milk as weighing 34.4 ounces per quart.

As to prices, they are mainly those of Baltimore markets, corrected in some cases by those of New York. Eggs are reckoned as costing in the spring eighteen cents, in fall and winter twenty-five cents, canned fruit is put down at the price paid for the fruit in summer. The cost of raw material is given in all cases, bread being reckoned at the cost of the flour contained in it.

In three different seasons, four days in succession are selected, these days being the ones considered most trying to the housekeeper—Saturday, Sunday, Monday and Tuesday, and this gives an opportunity to show how the food should be planned and cooked ahead.

It is intended that on Saturday the food for Sunday should be cooked as nearly as possible, as the Sunday dinner should be a good one but requiring a minimum of labor on that day; the dinner on Monday should be such as can be cooked on the back of the stove and in the oven.

The recipes will have to be varied a little according to advice given in appropriate places as to economy, *e. g.*, substituting beef fat for butter, or adding it when skim milk is used instead of whole milk.

It is intended that each day there shall be a small surplus of money for purchasing seasonings and flavors.

INTRODUCTION TO BILLS OF FARE, CLASS I.

(*To the Mother of the Family.*)

In the general introduction the writer has stated a few principles that should guide us in choosing our food. We have learned that to keep us in good health and working order we ought to have a certain amount of what is best furnished by meat, eggs, milk and other animal products, and that we must also have fats as well as what is given us in grains and vegetables.

But now our work has only just begun for we are to furnish these food principles in the shape of cooked dishes to be put on the family table three times a day, and the dishes must not only be nourishing but they must taste good, and there must be plenty of variety from day to day; and last—and this is the hardest point of all—we are to try to do this for the sum of *thirteen cents per person daily.*

I am going to consider myself as talking to the mother of a family who has six mouths to feed, and no more money than this to do it with. Perhaps this woman has never kept accurate accounts and does not know whether she spends more or less than this sum. She very likely has her "flush" days and her "poor" days according to the varying amounts of the family earnings, and it may be a comfort to her to know that if she could average these days and plan a little better, she can feed her family nicely on this sum.

A few facts as to what the writer knows to have been done in this line will not be amiss. I know a family of six belonging to one of the professional classes, half, grown people, and half, children, that lived for a year on an average of eleven cents per person daily, and no one would have said that they did not live well enough; they had

meat about four days out of the seven, there was always cake on their supper table, and they used plenty of fruit.

Here is an average bill of fare. Breakfast—milk toast, fried potatoes, coffee; dinner—soup made of shank of beef, fried liver, rice and potatoes; supper—bread and butter, fried mush, stewed pears and cake. Next day there was pressed beef made from the soup meat chopped and flavored, and next day there was cheap fish nicely fried. The head of this household was a skillful economist, absolutely no mistakes were made in cooking, and not a scrap was wasted, she had a long list of simple dishes at her command and she especially studied variety. "I abandon even a favorite dish for weeks," she said, "if any one tires of its." I give this as a sample of what I know to have been done by a highly respectable family in a city of small size in one of our eastern states.

It must be mentioned that the price on which this family lived in comfort could not have been as low as it was but for one great help; they had a small garden that furnished green vegetables and a little fruit. But then almost every family has some special advantage that would lower the rate somewhat; one buys butter or fruit advantageously of friends in the country, another can buy at wholesale when certain staples are cheapest, still another may be able to keep a few fowls, and so on. Numerous instances could be brought to prove that the food for a family can be purchased in a raw condition for the sum per head for which we have undertaken to buy it, and that by skill in cooking, flavoring and giving a right variety, a healthful and very acceptable diet can be furnished, though it cannot, of course, contain luxuries.

Another thing, when I speak of a woman who is to buy the food of a family for 13 cents apiece daily, I have in mind the wife of a man who earns this sum himself, the wife having her time to attend to the housework and children. If a woman helps earn, as in a factory, doing most of her housework after she comes home at night, she must certainly have more money than in the first case in order to accomplish the same result, for she must buy her bread already baked and can only cook those dishes that take the least time.

I shall take for granted that you have the kitchen utensils described on page 179; if not, buy them, because you cannot afford to do without them Food is very expensive compared with pots and pans; you must not spoil food for lack of the right things to cook it in.

I only ask you in advance to try the recipes I shall give and to try to lay aside your prejudices against dishes to which you are not accustomed, as soups and cheese dishes for instance. You cannot afford to reject anything that will vary your diet, for many good tasting things you cannot buy.

I know it is hard for a busy woman to give to her cooking a bit more time than will "just do," but if you make it a rule to determine the night beforehand just what you will cook on the following day, no matter how simple the food may be, you will gain this result; with the materials at your disposal you will put before your family much better food, and they will call you a good cook and think that no family need live better than they; and this impression will be made principally from your having the right variety. Let us understand, to begin with, that it is your business in life just now to conquer this food question as it affects your family. Just as the business man must watch the market and take advantage of a half cent a pound on an article, that he may successfully compete with his neighbor, so you must be on the alert to use every possible advantage. It is a struggle in which energy and calculation will tell for a great deal, and you will have solid enjoyment in every point that you gain.

In buying meat your saving cannot be so much in quantity as in quality. Try to learn the different parts of an animal, and to distinguish between meat from a fat ox and that from a lean one, for, as we have explained, the former has less water in it, and why should you pay good money for that which nature gives you free? In winter, try to buy meat ahead so that you can make it tender by keeping it, and you will notice, too, that the larger the piece you buy the smaller is the per cent of bone you get with it. The per cent of bone in the whole animal, as in the case of an ox, is not more than 10 or 11 per cent, but the buyer of a small piece of meat often gets twice that proportion. As we have said again and again in these pages, the low-priced or tougher parts have as much nutriment for you as the rib roast which is beyond your purse. Choose often the fat middle rib and cook it long and slowly; buy the neck and scrag of mutton, and make a stew with vegetables; buy half a calf's head, and see what a fine soup you can make of it. Have beef's liver now and then, and tripe, rather than put your money into sausage of doubtful quality. By all means buy fish when it is

cheap, catfish, for instance, which are excellent fried. Keep suet always on hand and use instead of butter, as has been directed.

No one need tell you how valuable salt pork and bacon are for you,—the only danger is that you will use too much of them.

In buying eggs, you must be governed by the price; in winter use as few as possible, and even in the spring when they are cheapest, remember that they are not as cheap as the lowest priced cuts of meat from fat animals. But when they cost only 15 cents a dozen you can well disregard any small comparison of nutritive values, in consideration of their high worth in furnishing variety; you can afford to use them now and then in the place of meat and in making the various egg dishes.

Of the value of cheese as a regular dish to take the place of meat, you can read in another part of this essay. Buy it once a week at least, the skim variety, if you cannot afford the others, and grate or cook it according to the recipes given.

Try to find a reliable milkman and buy skim milk at half the price of full, and use it for all cooking purposes, keeping full milk, and, if possible, a little of the cream, for coffee.

Now let us take the vegetable part of your diet. You must keep

Grains.

on hand every kind of flour and grain that is not too expensive; be thankful that wheat flour is so good and so cheap, it will be your best friend. If you are not already skillful in using it in bread and other doughs, you will waste your materials and make mistakes at first, but there is nothing for you but to become mistress of this department of cookery. Use bread freely in all the bread dishes, learn how to make every one. You will use buckwheat for cakes, rice for puddings, barley in soups, oatmeal and cornmeal for mushes, and you must learn to use them all in as many ways as possible. The grains are cheaper foods for us than vegetables, although dried peas, beans and lentils follow hard upon them. Even the potato, which may be called our favorite vegetable, is more expensive than wheat flour, if we are talking only of food values.

Except in the height of their season, have nothing to do with green vegetables, at least not under the impression that they are cheap; if you buy them, know that you are paying for flavors and variety, rather than for food. But even in the early spring, buy plenty of such vegetables as onions, carrots, parsley and other green herbs for your soups and stews. When you go for a walk in

the country, be sure to bring home mint and sorrel in your pocket; the former will make you a nice meat sauce, the latter a delightful flavor in soup. It will be perfectly easy for you to grow in a window box that delicious herb, parsley, and have it always fresh.

For a low purse, there is no help so great as a knowledge of flavorings. When we remember that we can live on bread, beans, peas and a little cheap meat and fat the year round if we can only make it "go down," we shall realize the importance of such additions as rouse the appetite; there is room here for all your skill and all your invention. Always make a cheap but nutritious dish inviting in appearance; especially does this influence the appetites of children who are delighted with a very plain cake if only a few raisins or some sugar appear on the top.

The bills of fare on pages 261 to 268, where seventy-eight cents covers the cost of food for a family of six per day, and where the amount of food is carefully weighed and estimated, is meant only to suggest to you how in a few cases your food problem can be solved. You can, no doubt, spend the money in ways that will better suit the tastes of your family, but I beg you to examine anew your favorite dishes to see if they are as nutritious as they should be for their price. Remember that the proteid column is the one that you must look to most carefully because it is furnished at the most expense, and it is very important that it should not fall below the figures I have given. If, for instance, you should economize in meat in order to buy cake and pastry, this column would suffer at the expense of the other two and your family would be under nourished.

BILLS OF FARE, CLASS I.

For family of six, average price seventy-eight cents per day, or thirteen cents per person.

SATURDAY, MAY.

Breakfast—Flour pancakes, (p. 234) with sugar syrup, coffee.

Dinner—Bread soup (p. 179), beef neck stew, noodles (p. 225), swelled rice pudding (p. 236).

Supper—Browned flour soup, with fried bread (p. 245), toast and cheese (p. 206, No. 1).

	Proteids. oz.	Fats. oz.	Carbo-hydrates. oz.	Cost in cents.
1-2 lb. rice	.64	.08	6.12	4
1 lb. sugar	-	-	15.42	7
3-4 lb. fat cheese	3.00	3.48	.24	11 1-4
2 qts. skim milk	2.12	.48	3.30	8
2 lb. flour	3.84	.48	22.88	6
1-2 qt. whole milk	.58	.62	.83	3 1-2
2 eggs	.34	.32	-	3
2 1-2 lbs. beef neck	8.40	2.20	-	20
3-8 lb. suet	-	5.88	-	3
1-8 lb. coffee	-	-	-	3 2-5
3 1-2 lbs. bread	3.36	.28	29.06	8 1 20
Total	22.28	13.82	77.85	77 1-5
Required	19.19	12.42	78.03	78

SUNDAY, MAY.

Breakfast—Milk toast, coffee.

Dinner—Stuffed beef's heart (p. 197), potatoes stewed with milk, dried apple pie (p. 237), bread and cheese, corn coffee (p. 254).

Supper—Noodle soup (from Saturday, p. 225), broiled herring, bread, tea.

	Proteids. oz.	Fats. oz.	Carbo-hydrates. oz.	Cost in cents.
Heart of fat ox weighing 2 lbs	5.76	2.56	-	10
4 lbs. bread	3.84	.32	33.22	9 1-5
3-4 lb. sugar	-	-	11.88	5
1 qt. skim milk	1.06	.24	1.65	4
1-2 lb. dried apples	.10	-	4.50	6
1 1-2 lb. flour	2.88	.36	17.16	4 1-2
12 smoked herring (1 pound)	3.36	1.36	-	10
1-4 lb. suet	-	9.23	-	2
2 lbs potatoes	.64	-	6.62	2 1-2
1-4 lb. butter	-	3.33	-	6 1-4
1-2 lb. skim cheese	2.40	1.07	.40	4
Tea	-	-	.	2
1-8 lb. coffee	-	-	-	3 2-5
1 qt. whole milk	1.16	1.23	1.65	7
Total	21.20	14.39	77.08	76
Required	19.19	12.42	78.03	78

MONDAY, MAY.

Breakfast—Oatmeal mush, with milk ana sugar, bread, coffee.

Dinner—Pea soup (p. 243), mutton stew (p. 200), boiled potatoes, bread.

Supper—Bread pancakes (p. 227), fried bacon, tea.

	Proteids. oz.	Fats. oz.	Carbo-hydrates. oz.	Cost in cents.
2 eggs	.34	.32	-	3
3-4 lb. oatmeal	1.74	.72	7.80	3 3-4
1-8 lb. coffee	-	-	-	3 2-5
1-2 lb. sugar	-	-	7.92	3 1-2
1 1-2 qts. skim milk	1.59	.36	1.48	6
3-4 lb. bacon	.36	9.60	-	9
4 lbs. potatoes	1.28	-	13.24	5
4 lbs. bread	3.84	.32	33.20	9 1-5
1 qt. whole milk	1.16	1.24	1.66	7
3 lbs. shoulder of mutton	8.16	2.88	-	21
1 lb. peas, dried	3.68	.32	8.32	5
1-2 lb flour	.96	.12	5.72	1 1-2
Total	23.11	15.88	80.34	77.3
Required	19.19	12.42	78.03	78

TUESDAY, MAY.

Breakfast—Oatmeal mush and milk, buttered toast, coffee.

Dinner—Fried catfish with mint sauce (p. 214), fried potatoes, bread.

Supper—Fried farina pudding (p. 237), broiled salt pork, bread, tea.

	Proteids. oz.	Fats. oz.	Carbo-hydrates. oz.	Cost in cents.
1 lb. oatmeal	2.32	.96	10.40	5
1 qt. whole milk	1.16	1.23	1.65	7
1 qt. skim milk	1.06	.24	1.65	4
3 1 2 lbs. catfish	7.00	.20	-	17 1-2
1 1-2 lbs farina	2.50	-	18.22	7 1-2
2 eggs	.34	.32	-	3
4 1-2 lbs. bread	4.32	.36	37.36	10 35-100
Coffee	-	-	-	3 2-5
2 lbs potatoes	.64	-	6.62	2 1-2
5-8 lb. salt pork	.30	8.00	-	7 1-2
1-8 lb. butter	-	1.67	-	3 1-8
1-4 lb. sugar	-	-	3.96	1 3 4
Tea	-	-	-	2
Total	19.64	12.98	79.86	74 3-5.
Required	19.19	12.42	78.03	78.

SATURDAY, SEPTEMBER.

Breakfast—Soda biscuit, baked potatoes with drawn butter sauce, cocoa.

Dinner—Pea soup (p. 243), Irish stew, bread.

Supper—Corn mush and molasses, bread and grated cheese, tea.

	Proteids. oz.	Fats. oz.	Carbo-hydrates. oz.	Cost in cents.
1 lb. dried peas	3.68	.32	8.32	5
2 lbs. scrag of mutton	5.44	1.92	-	16
3 lbs. potatoes	.96	-	9.94	3 3-4
3 lbs. bread	2.88	.24	24.90	6 9-10
2 lbs. cornmeal	3.14	.90	19.60	6
1-4 lb. sugar	-	-	3.96	1 3-4
1-4 lb. fat cheese	1.00	1.56	.08	3 3-4
1 qt. whole milk	1.16	1.23	1.65	7
1-4 lb. butter	-	3.33	-	6 3-20
1 1-2 lbs. flour	2.88	.36	17.16	6 3-4
1-4 lb. suet	-	3.92	-	2
1-4 lb. molasses	-	-	2-48	2 1-2
Cocoa shells	-	-	-	2
Tea	-	-	-	2
Total	21.14	13.78	87.99	71 1-2
Required	19.19	12.42	78.03	78

SUNDAY, SEPTEMBER.

Breakfast—Oatmeal and milk, bread and butter, cocoa.

Dinner—Broiled beef's liver, boiled potatoes and carrots with fried onions (p. 242), bread and cheese.

Supper—Lentil soup with fried bread (p. 244), smoked herring, bread, barley porridge (p. 246).

	Proteids. oz.	Fats. oz.	Carbo-hydrates. oz.	Cost in cents.
1 1-2 lbs. beef liver	4.80	.96	-	15
3 lbs potatoes	.96	-	9.94	3 3-4
1 lb. carrots	-	-	1.44	1 1-2
1 1-2 lbs. oatmeal	3.48	1.44	15.60	7 1-2
1-2 lb. lentils	2.04	.16	4.32	5
1 1-2 qt whole milk	1.74	1.85	2.48	10 1-2
1-2 lb. sugar	-	-	7.92	3 1-2
1-4 lb pearl barley	.44	.06	2.86	2
1-4 lb. suet	-	3.92	-	2
4 lbs. bread	3.84	.32	33.20	9 1-5
6 smoked herring (8 ounces)	1.68	.68	-	5
1-4 lb. butter		3.33	-	6 1-4
1.4 lb. fat cheese	1.00	1.16	-	3 3 4
Cocoa shells	-	-	-	2
Total	19.98	13.88	77.76	76 9-10
Required	19.19	12.42	78.03	78

MONDAY, SEPTEMBER.

Breakfast—Buckwheat cakes, fried bacon, coffee.

Dinner—Giblet soup (p. 204), baked potatoes with drawn butter sauce, bread.

Supper—Codfish balls (p. 203), cheese, bread, tea.

	Proteids. oz.	Fats. oz.	Carbo-hydrates. oz.	Cost in cents.
2 lbs. buckwheat flour	3.04	.64	23.30	10
Giblets	2.20	.12	-	8
3 lbs potatoes	.96	-	9.94	3 3-4
3-4 lb. bacon	.36	9.60	-	9
4 1-2 lbs. bread	4.32	.36	37.36	10 35-100
1-2 lb. sugar	-	-	7.92	3 1-2
3-4 lb. fat cheese	3.00	2.48	.24	11 1-4
1 lb. salt codfish	4.80	.16	-	8
Tea	-	-	-	2
1 qt. whole milk	1.16	1.23	1.65	7
1-8 lb. coffee	-	-	-	3 2-5
Total	19.84	15.59	80.41	76 1-4
Required	19.19	12.42	78.03	78

TUESDAY, SEPTEMBER.

Breakfast—Fried bacon, boiled potatoes, bread, coffee.

Dinner—Boiled corned beef with horseradish sauce, stewed cabbage, bread, barley porridge (p 246).

Supper—Pea soup, yeast biscuit and butter, stewed fruit.

	Proteids. oz.	Fats. oz.	Carbo-hydrates. oz.	Cost in cents.
1 1-2 lbs. corn beef	6.96	1.54	-	15
3 lbs. cabbage	.80	-	2.00	6
2 lbs. flour	3.84	.48	22.88	6
2 lbs. potatoes	.64	-	6.62	2 1-2
1 lb dried peas	3.68	.32	8.32	5
3 1-2 lbs bread	3.36	.28	29.06	8 1-20
1-2 lb. bacon	.24	6.40	-	6
1-4 lb. butter	-	3.33	-	6 1-4
1-8 lb. suet	-	1.96	-	1
1-2 lb. pearl barley	.88	.12	5.72	4
1 qt. skim milk	1.06	.24	1.65	4
1 pt. whole milk	.58	.62	.83	3 1-2
1-8 lb coffee	-	-	-	3 4-10
1-2 lb. sugar	-	-	7.92	3 1-2
Fruit	-	-	-	3
Total	22.04	15.29	85.00	77 1-5
Required	19.19	12.42	78.03	78

SATURDAY, JANUARY.

Breakfast—Fried bacon, corn bread (p. 229), coffee.

Dinner—Browned flour soup (p. 245), stewed mutton, mashed potatoes, bread.

Supper—Baked beans, bread, apple dumplings (p. 237), with pudding sauce (p. 240), tea.

	Proteids. oz.	Fats. oz.	Carbo-hydrates. oz.	Cost in cents.
3 lbs. neck of mutton	8.16	2.88	-	24
3 lbs. potatoes	.98	-	9.94	3 3-4
4 lbs. bread	3.84	.32	33.20	9 1-5
1 lb. flour	1.92	.24	11.44	3
2 lbs. corn meal	3.14	1.20	22.40	6
1 lb. beans	3.68	.32	8.56	5
1-2 lb. sugar	-	-	7.92	3 1-2
1-2 lb. bacon	.24	6.44	-	6
1-8 lb. suet	-	1.96	-	1
1-8 lb. coffee	-	-	-	3 2-5
1 qt. whole milk	1.16	1.23	1.65	7
Apples	-	-	-	2
Tea	-	-	-	2
Total	23.10	14.59	95.11	75 4-5
Required	19.19	12.42	78.03	78

SUNDAY, JANUARY.

Breakfast—Fried codfish, bread and butter, coffee.

Dinner—Sheep's head stew with soda biscuit dumplings, baked potatoes, bread and grated cheese, cocoa.

Supper—Potato and onion salad, broiled salt pork, bread, corn mush with pudding sauce (p. 240).

	Proteids. oz.	Fats. oz.	Carbo-hydrates. oz.	Cost in cents.
2 lbs. corn meal	3.14	1.20	22.40	6
1 qt. skim milk	1.06	.24	1.65	4
1 pt. whole milk	.58	.62	.83	3 1-2
1-2 lb. sugar	-	-	7.92	3 1-2
3 lbs. bread	2.88	.24	24.90	6 9-10
1 lb. salt codfish	4.80	-	-	8
1-2 lb. butter	-	6.66	-	12 1-2
1-4 lb. skim cheese	1.20	.53	.20	2
4 lbs. potatoes	1.28	-	13.25	5
1-4 lb. salt pork	.12	3.20	-	3
1-4 lb suet	-	3.92	-	2
3-4 lb. flour	1.44	.18	8.58	2 1-4
1 sheep's head, assumed to contain 1 1-2 lbs. meat	4.08	1.44	-	12
Onions	-	-	-	2
Cocoa shells	-	-	-	2
Coffee	-	-	-	3 2-5
Total	20.58	18.23	79.73	78
Required	19.19	12.42	78.03	78

MONDAY, JANUARY.

Breakfast—Fried mush and molasses, bread, coffee.

Dinner—Soup (from boiled beef) with macaroni, boiled beef flank with mustard sauce, bean puree, bread.

Supper—Boiled potatoes with butter gravy, dried apple roly poly pudding (p. 237), bread, tea.

	Proteids. oz.	Fats. oz.	Carbo-hydrates. oz.	Cost in cents.
2 lb. beef flank	6.72	1.76	-	16
1 lb. beans	3.68	.32	8.56	5
1-2 lb. dried apples	.10	-	4.50	6
2 lbs. potatoes	.64	-	6.62	2 1-2
2 lbs. corn meal	3.14	1.20	22.40	6
1 1-2 lbs flour	2.88	.36	17.16	4 1-2
1-4 lb. butter	-	3.33	-	6 1-4
1-4 lb. suet	-	3.92	-	2
1-4 lb. molasses	-	-	2.48	2 1-2
1-2 lb. sugar	-	-	7.92	3 1-2
3 lbs. bread	2.88	.24	24.90	6 9-10
1 qt whole milk	1.16	1.23	1.65	7
1-8 lb. coffee	-	-	-	3 2-5
Tea	-	-	-	2
1-4 lb. macaroni	.36	.02	3.06	3 3-4
Total	21.56	12.38	99.25	77 3 10
Required	19.19	12.42	78.03	78

TUESDAY, JANUARY.

Breakfast—Fried potatoes, bread, coffee.

Dinner—Browned farina soup with toast (p. 245), stewed mutton with yeast dumpings.

Supper—Bean soup, milk toast, tea.

	Proteids. oz.	Fats. oz.	Carbo-hydrates. oz.	Cost in cents.
2 1-2 lbs. mutton	6.80	2.40	-	20
1 qt. skim milk	1.06	.24	1.65	4
1 1-2 lbs. beans	5.52	.48	12.84	7 1-2
1-4 lb. butter	-	3.33	-	6 1-4
1-2 lb. suet	-	7.84	-	4
1-2 lb. sugar	-	-	7.92	3 1-2
3 lbs. potatoes	.96	-	9.94	4 1-4
1 1-2 lbs. flour	2.88	.36	17.16	4 1 2
1 qt. whole milk	1.16	1.23	1.65	7
3 lbs. bread	2.88	.24	24.90	6 9-10
1-4 lb. farina	.42	-	3.03	1 3-4
1-8 lb. coffee	-	-	-	3 2-5
Tea	-	-	-	-
Total	21.68	16.12	79.09	75
Required	19.19	12.42	78.03	78

BILLS OF FARE, CLASS II.

For family of six. Average price $1.26 per day, or 18 cts. per person.

The bills of fare in this class will not be given in detail. Taking those given for Class I. as a basis, it is expected that certain luxuries will be added and a better quality of food used; the quantities of proteid, fat and carbohydrate will then not be lowered, which is the point of greatest importance.

BILLS OF FARE, CLASS III.

For family of six, average price, $1.38 per day, or twenty-three cents per person.

SATURDAY, MAY.

Breakfast—Oranges, egg omelet on toast, boiled rice with milk and sugar, coffee.

Dinner—Beef soup with egg sponge (p. 250), macaroni with cheese (p. 225), dandelion greens, bread.

Supper—Sour cream soup (p. 247), meat croquettes of soup meat (p. 198), graham bread and butter, tea, cake.

	Proteids. oz.	Fats. oz.	Carbo-hydrates. oz.	Cost in cents.
1 lb. rice	1.28	.16	12.24	8
1-2 lb. sugar	-	-	7.92	3 1-2
6 oranges	-	-	-	10
3-4 lb. macaroni	1.08	-	9.18	12 3-4
4 lbs. bread	3.84	.32	33.22	9 1-5
2 lbs. flour	3.84	.48	22.88	6
1-8 lb. coffee	-	-	-	3 2-5
2 qts. whole milk	2.32	2.46	3.30	14
10 eggs	1.70	1.60	-	15
2 1-2 lbs. meat	8.40	2.20	-	20
3-4 lb. butter	-	9.99	-	18 3-4
1-2 lb. fat cheese	2.00	2.32	.16	7 1-2
Sour cream and flavors for soup	-	-	-	6
Tea	-	-	-	2
Total	24.46	19.53	88.90	136 1-10
Required	19.19	12.42	78.03	138

SUNDAY, MAY.

Breakfast—Oatmeal mush with sugar and milk, bread and butter, coffee.

Dinner—Ham and eggs, salad of cold beans and lettuce, rhubarb pie, cocoa, bread.

Supper—Rice pancakes (p. 227), with sugar syrup, stewed potatoes, tea.

	Proteids. oz.	Fats. oz.	Carbo-hydrates. oz.	Cost in cents.
3-4 lb. oatmeal	1.74	.72	7.80	3 4-5
1-8 lb. coffee	-	-	-	3 2-5
1 lb. sugar	-	-	15.84	7
2 qts. whole milk	2.32	2.46	3.30	14
3-4 lb. butter	-	9.99	-	18 3-4
1 lb. ham	3.84	5.84	-	25
1-8 lb. suet	-	1.96	-	1
12 eggs	2.04	1.92	-	18
Cocoa	-	-	-	4
3 lbs. potatoes	.96	-	9.94	3 3-4
4 lbs. bread	3.84	.32	33.20	9 1-5
1-2 lb. lettuce	.10	-	.20	5
1 lb. beans	3.68	.32	8.55	5
Rhubarb	-	-	-	4
1-2 lb rice	.64	.08	6.12	4
1 1-2 lbs. flour	2.88	.36	17.16	4 1-2
Tea	-	-	-	2
Salad dressing	-	-	-	5
Total	22.04	23.97	102.11	137
Required	19.19	12.42	78.03	138

MONDAY, MAY.

Breakfast—Oranges, milk toast, coffee

Dinner—Roast mutton and bread dressing (p. 236), mashed potatoes, corn mush with sugar and milk, soda cream (p. 255).

Supper—Parsnip soup (p. 244) with yeast dumplings (p. 250), bread and butter, sponge cake, tea.

	Proteids. oz.	Fats. oz.	Carbo-hydrates. oz.	Cost in cents.
3 1-2 lbs. bread	3.36	.28	29.06	8 1-10
3 lbs. mutton	8.16	2.88	-	48
2 qts. whole milk	2.32	2.46	3.30	14
1 1-2 lbs. sugar	-	-	23.76	10 1-2
1 lb. flour	1.92	.24	11.44	3
1-2 lb. butter	-	6.66	-	12 1-2
1-8 lb. coffee	-	-	-	3 2-5
6 oranges	-	-	-	10
2 lb. cornmeal	3.14	1.20	22.40	6
4 eggs	.68	.64	-	6
3 lbs. potatoes	.96	-	9.94	3 3-4
Tea	-	-	-	2
Soda cream	-	-	-	3
Parsnips	-	-	-	6
Total	20.54	14.36	99.90	136 1-4
Required	19.19	12.42	78.03	138

TUESDAY, MAY.

Breakfast—Buttered toast, coffee, canned fruit.

Dinner—Sorrel soup (p 245), fried catfish, noodles (p 225), bread, swelled rice pudding (p. 236)

Supper—Fried mush, stewed rhubarb, fresh rusks and butter (p. 230), tea.

	Proteids. oz.	Fats. oz.	Carbo-hydrates. oz.	Cost in cents.
Canned fruit	-	-	-	15
2 lbs. corn meal	3.14	1.20	22.40	6
3 lbs. bread	2.88	.24	24.90	6 9-10
1 1-2 qts whole milk	1.74	1 86	2.50	10 1-2
2 qts skim milk	2.12	.48	3.30	8
Rhubarb	-	-	-	8
2 lbs. flour	3.84	.48	22.88	6
1 lb butter	-	13.33	-	25
1-2 lb sugar	-	-	7.92	3 1-2
Sorrel, etc., for soup	-	-	-	5
1-2 lb. rice	.64	.08	6.12	4
1-4 lb. suet	-	3.92	-	2
3 lbs. fresh fish	8.00	.24	-	18
1-8 lb. coffee	-	-	-	3 2-5
4 eggs	.68	.64	-	6
Tea	-	-	-	2
Total	23.04	22.47	90.02	129 3-10
Required	19.19	12.42	78.03	138

SATURDAY, SEPTEMBER.

Breakfast—Hominy mush with sugar syrup, stewed pears, toasted crackers, coffee.

Dinner—Plum soup (p. 248), broiled beef steak, boiled green corn, turnips and potatoes (p 242), bread, apple pie (p 237).

Supper—Irish stew (p. 200), biscuit and butter, yeast doughnuts (p. 231), tea.

	Proteids. oz.	Fats. oz.	Carbo-hydrates. oz.	Cost in cents.
1 lb. hominy	1.58	.60	11.20	5
Pears and plums	-	-	-	5
2 lbs. bread	1 92	.16	16.60	4 3-5
1-2 lb crackers	.50	-	4.15	5
2 lbs beef steak	6.72	1.76	-	36
1 doz. green corn	-	-	-	15
2 lbs. potatoes	.64	-	6.62	2 1 2
Apples	-	-	-	4
1 lb. turnips	.15	-	1.12	0 7-10
3 lbs. flour	3.76	.64	34.32	9
1-8 lb suet	-	1.96	-	1
1 lb. mutton	2.72	.96	-	8
3-4 lb butter	-	9.99	-	18 3-4
2 eggs	.34	.32	-	4 1-6
Tea	-	-	-	2
1 lb. sugar	-	-	15.84	7
1 qt. whole milk	1.16	1.23	1.65	7
1-8 lb coffee	-	-	-	3 2-5
Total	20.83	17.62	91.50	138 1-10
Required	19.19	12.42	78.03	138

SUNDAY, SEPTEMBER.

Breakfast—Sour milk pancakes with sugar syrup (p. 234), sausage, bread, cucumbers, coffee.

Dinner—Green corn soup (p. 245), fricasseed chicken (p 203), potatoes and carrots (p. 242) with fried onions, bread.

Supper—Fried farina pudding (p. 237), water toast, radishes, tea.

	Proteids. oz.	Fats. oz.	Carbo-hydrates. oz.	Cost in cents.
Radishes	-	-	-	3
1 lb. sausage	2.32	6.00	-	12
3-4 lb. sugar	-	-	9.90	5 1-4
1 1-2 qts. whole milk	1.74	1.85	2.48	10 1-2
3 lbs. bread	2.88	.24	24.90	6 9-10
1-2 doz. green corn	-	-	-	7 1-2
An old chicken (3 pound)	9.00	1.90	-	50
2 lbs potatoes	.60	-	6.60	2 1-2
1-2 lb carrots	-	-	.72	1
Cucumbers	-	-	-	2
1 1-2 lbs. flour	2.88	.36	17.16	4 1-2
1-2 lb. farina	.84	-	6 00	2 1-2
1-4 lb. butter	-	3.33	-	6 1-4
1 qt. sour milk	1.06	.24	1.65	4
Coffee	-	-	-	3 2-5
Tea	-	-	-	2
2 Eggs	.34	.32	-	4 1-6
Total	21.66	14.24	69.41	127 2 5
Required	19.19	12.42	78.03	138

MONDAY, SEPTEMBER.

Breakfast—Codfish balls, bread and butter, coffee, stewed apples.

Dinner—Roast beef, baked potatoes, stewed tomatoes, lemonade, bread.

Supper—Berry roly poly (p 237), cheese, bread and butter, tea.

	Proteids. oz.	Fats. oz.	Carbo-hydrates. oz.	Cost in cents.
3-4 lb. codfish	3.60	-	-	6
4 lbs. potatoes	1.28	-	13.24	5
3 lbs bread	2.88	.24	24.90	6 9-10
3-4 lb butter	-	9.99	-	18 3-4
2 qts. whole milk	2.32	2.46	3.30	14
1 lb. sugar	-	-	15.84	7
2 1-2 lbs. beef	8.40	2.20	-	40
3 lbs tomatoes	-	-	4.00	5
Lemons	-	-	-	7
1 1-2 lbs. flour	3.88	.36	17.16	4 1-2
1-2 lb. fat cheese	2.00	2.32	.18	7 1-2
1-8 lb coffee	-	-	-	3 2-5
Tea	-	-	-	2
Fruit	-	-	-	10
Total	24.36	17.57	78.62	137
Required	19.19	12.42	78.03	138

Tuesday, September.

Breakfast—Broiled mackerel, stewed potatoes, bread and butter, coffee.

Dinner—Sour cream soup (p. 247), roast mutton with bread stuffing, boiled beets, bread pudding (p. 239, No 2).

Supper—Apple fritters (p. 241) with sugar syrup, bread and butter, tea.

	Proteids. oz.	Fats. oz.	Carbo-hydrates. oz.	Cost in cents.
1 1-2 lbs. flour	2.88	.36	17.16	4 1-2
4 eggs	.68	.64	–	8 1-3
2 qts. whole milk	2.32	2.46	3.30	14
1 lb sugar	–	–	15.84	7
1-8 lb. suet	–	1.96	–	1
2 1-2 lbs. mutton	6.80	2.40	–	40
2 lbs. beets	–	–	3.00	5
1 1-2 lbs. salt mackerel	4.56	3.00	–	18 3-4
1 1-2 lbs. potatoes	.48	–	4.96	1 9-10
4 lbs. bread	3.84	.32	33.20	9 1-5
1-2 lb. butter	–	6.66	–	12 1-2
Sour cream and apples	–	–	–	8
1-8 lb. coffee	–	–	–	3 2-5
Tea	–	–	–	2
Total	21.56	17.80	79.46	135 1-2
Required	19.19	12.42	78.03	138

Saturday, January.

Breakfast—Buckwheat cakes and sugar syrup, bread and butter, coffee.

Dinner—Roast fresh pork with apple sauce, mashed potatoes, Indian pudding (p. 238), bread.

Supper—Herring and potato salad, lentils with prunes (p. 242), bread and butter, tea.

	Proteids. oz.	Fats. oz.	Carbo-hydrates. oz.	Cost in cents.
2 lbs. buckwheat flour	3.04	.64	23.20	10
1 1-2 lbs. corn meal	2.28	.91	16.80	4 1-2
1 lb. butter	–	13.33	–	25
3-4 lb. sugar	–	–	11.88	5 1-4
1 qt. whole milk	1.16	1.23	1.65	7
Apples	–	–	–	4
2 1-2 lbs. fresh pork	8.00	2.80	–	37 1-2
3 lbs. potatoes	.96	–	9.94	3 4-5
2 eggs	.34	.32	–	4 1-6
1 qt. skim milk	1.16	.24	1.65	4
3 lbs. bread	2.88	.24	24.90	6 9-10
1-2 lb. lentils	2.04	.16	4.32	5
1-2 lb prunes	.15	–	3.80	5
1-8 lb. coffee	–	–	–	3 2-5
Tea	–	–	–	2
6 herrings	1.68	.68	–	5
Salad dressing	–	–	–	5
Total	23.69	20.55	98.14	137 1-2
Required	19.19	12.42	78.03	138

SUNDAY, JANUARY.

Breakfast—Milk toast, fried potatoes, coffee.

Dinner—Cold roast pork, noodles (p. 225), stewed cabbage, bread, swelled rice pudding (p. 236), corn coffee (p. 254).

Supper—Potato soup (p. 244), grated cheese, bread and butter, raised cake (p. 230), canned fruit, tea.

	Proteids. oz.	Fats. oz.	Carbo-hydrates. oz.	Cost in cents.
1-4 lb. fat cheese	1.08	.95	.06	3 3-4
4 lbs potatoes	1.28	-	13.24	5
2 lbs flour	3.84	.48	22.88	6
4 eggs	.68	.64	-	8 1-3
2 qts. whole milk	2.32	2.46	3.30	14
1 qt. skim milk	1.06	.24	1.65	4
3-4 lb. butter	-	9.99	-	18 3-4
1 lb. sugar	-	-	15.42	7
2 lbs. fresh pork	6.40	2.24	-	30
2 lbs. cabbage	.80	-	1.60	8
1-2 lb. rice	.64	.08	6.12	4
3 lbs. bread	2.88	.24	24.90	6 9-10
Corn (dry grain)	-	-	-	2
Canned fruit	-	-	-	10
1-8 lb. coffee	-	-	-	3 2-5
Tea	-	-	-	2
Total	20.98	17.32	89.17	133 1-10
Required	19.19	12.42	78.03	138

MONDAY, JANUARY.

Breakfast—Buckwheat cakes, sausage, coffee, apple sauce.

Dinner—Pea soup (p. 243), roast beef, baked potatoes, canned tomatoes, barley gruel (p. 246).

Supper—Potato soup with egg and bread balls (p 249), brown bread and butter, canned fruit, tea.

	Proteids. oz.	Fats. oz.	Carbo-hydrates. oz.	Cost in cents.
2 lbs. buckwheat flour	3.04	.64	23.20	10
1 lb. sausage	2.32	6.00	-	12
2 lbs. beef	6.72	1.76	-	32
3 lbs. potatoes	.96	-	9.94	3 3-4
2 lbs. tomatoes (canned at home)	.19	-	3.50	6
3 lbs. bread	2.88	.24	24.90	6 9-10
2 eggs	.34	.32	-	4 1-6
1-2 lb. barley	.88	.12	5.72	4
1 qt. whole milk	1.16	1.23	1.65	7
1-2 lb. sugar	-	-	7.92	3 1-2
1 lb dried pease	3.68	.32	8.32	5
1-2 lb. butter	-	6.66	-	12 1-2
Canned fruit	-	-	-	10
1-8 lb coffee	-	-	-	3 2-5
Tea	-	-	-	2
Apples	-	-	-	5
Total	22.17	17.29	85.15	127 1-5
Required	19.19	12.42	78.03	138

TUESDAY, JANUARY.

Breakfast—Graham biscuits, fried bacon, apple sauce, coffee.

Dinner—Boiled mutton, baked potatoes, winter squash, dried apple short cake with pudding sauce, corn coffee.

Supper—Mutton and bean broth, bread and butter, cheese, tea, cookies.

	Proteids. oz.	Fats. oz.	Carbo-hydrates. oz.	Cost in cents.
3-4 lb. bacon	.36	9.06	-	9
1-2 lb. dried apples	.10	-	4.44	6
1 lb. beans	3.68	.32	8.56	5
1-4 lb. fat cheese	1.00	1.16	-	3 3-4
1 lb. sugar	-	-	15.84	7
2 qts. whole milk	2.32	2.46	3.30	14
2 1-2 lbs. mutton	6.80	2.40	-	30
3 lbs. potatoes	.96	-	9.94	3 3-4
2 lbs. winter squash	.16	-	3.20	10
Cookies	-	-	-	15
2 lbs. bread	1.92	.16	16.60	4 3-5
2 1-2 lbs. flour	4.80	.60	27.94	8 1-2
1-4 lb. butter	-	3.33	-	6 1-4
1-8 lb. coffee	-	-	-	3 2-5
Tea	-	-	-	2
Apples	-	-	-	5
Total	22.10	20.09	89.82	132 7 10
Required	19.19	12.42	78.03	136

TWELVE COLD DINNERS.

If a man is to eat a cold dinner for months or even for weeks, it is quite worth while to make that dinner as good as it can be, and to pack it nicely for carrying. Every one knows how it can take the edge off even a keen appetite to find his sandwich smeared with apple pie, or his cake soaked with vinegar from the pickles. That a box or basket of given dimensions should hold as much as possible, and keep the different kinds of food separate, it must be divided into compartments.

Simplest—an oblong basket,—divide into two compartments by a piece of pasteboard cut so that it slips in rather tightly, then line the two compartments with nice wrapping paper put in fresh every day. It may be divided into four parts in the same way. A close

fitting tin spice box is nice for holding cheese. A tiny "salve" box should contain salt and pepper mixed. Sew leather straps on the cover of the basket inside, for holding knife, fork and spoon.

Put a strap around the basket that you may hang from it a little pail containing cold soups recommended for drinks in summer.

Cold puddings should be wrapped in strong writing paper, then in wrapping paper and pinned close.

COLD DINNERS FOR SUMMER.

1. Bread and butter, salad of potatoes and cold baked fish, cold boiled beef, molasses cookies, apple soup.

2. Corn bread, ham sandwiches, baked sweet apples, custard pie, plum soup.

3. Bread and butter, cold veal, hard boiled eggs, pickled beets, cherry pie.

4. Chopped beef sandwiches, salad of Lima beans, ginger snaps, cottage cheese, Irish moss lemonade.

5. Graham bread, cold roast mutton, cucumbers and salt, pumpkin pie, soda cream.

6. Bread and butter, dried beef, crackers, cheese, sponge cake, cold coffee.

COLD DINNERS FOR WINTER.

7. Bread, cold boiled pork, cold baked beans with mustard and vinegar, doughnuts, apple pie, cold coffee.

8. Yeast biscuits and butter, cold chicken, pickles, cold rice pudding, apples.

9. Cold soda biscuits, veal and ham sandwiches, Saratoga potatoes, mince pie.

10. Biscuits and butter with honey, cold corn beef and rye bread, dried apple tarts, cheese.

11. Bread and butter, smoked herring, pickled beans, gingerbread, apples.

12. Corn bread and butter, cold roast beef and white bread, bread and apple pudding, bread cake.

The Final Report of Professor S. H. Woodbridge on Steam Heating and Ventilation of the State House.

MY DEAR SIR: The work given to my care by the Board of State House Commissioners has been executed in as close accordance with the plans proposed in my communication to the Board under date of June 8, 1889, as has been found practicable.

The apparatus advised consisted of a fan and engine capable of moving and distributing under slight pressure 25,000 cubic feet of air per minute, a heater capable of heating that air from 20° below to 70° above zero, a system of iron conduits and of wall flues for the distribution of this air throughout the extension and to both the assembly halls of the main building, a system of dampers for the control of the quantities and the direction of flow of the air moved, a system of direct steam heaters under automatic control for the even warming of the rooms; boilers and chimney of sufficient capacity for the required work, and a system of vent flues and channels for the discharge of vitiated air.

The several parts of this combined system were in plan carefully proportioned to their required individual and associated duty and to the ordinary and the special requirements for which they were designed. Departures from that plan have been chiefly due either to modification in the building itself, and in required adaption to such changes, or else to the limited means at the disposal of the commissioners for the execution of the work.

Trials of the system have been personally made under conditions of weather favorable to a test of its ability to meet assumed maximum requirements. The results of the tests are herewith submitted in some detail, together with such notes as appear of possible value to a clearer knowledge of the purposes for which the several parts are designed and the method of their use for obtaining the best results.

MONDAY, SEPTEMBER.

Breakfast—Buckwheat cakes, fried bacon, coffee.

Dinner—Giblet soup (p. 204), baked potatoes with drawn butter sauce, bread.

Supper—Codfish balls (p. 203), cheese, bread, tea.

	Proteids. oz.	Fats. oz.	Carbo-hydrates. oz.	Cost in cents.
2 lbs. buckwheat flour	3.04	.64	23.30	10
Giblets	2.20	.12	-	8
3 lbs potatoes	.96	-	9.94	3 3-4
3-4 lb. bacon	.36	9.60	-	9
4 1-2 lbs. bread	4.32	.36	37.36	10 35-100
1-2 lb. sugar	-	-	7.92	3 1-2
3-4 lb. fat cheese	3.00	2.48	.24	11 1-4
1 lb. salt codfish	4.80	.16	-	8
Tea	-	-	-	2
1 qt. whole milk	1.16	1.23	1.65	7
1-8 lb. coffee	-	-	-	3 2-5
Total	19.84	15.59	80.41	76 1-4
Required	19.19	12.42	78.03	78

TUESDAY, SEPTEMBER.

Breakfast—Fried bacon, boiled potatoes, bread, coffee.

Dinner—Boiled corned beef with horseradish sauce, stewed cabbage, bread, barley porridge (p 246).

Supper—Pea soup, yeast biscuit and butter, stewed fruit.

	Proteids. oz.	Fats. oz.	Carbo-hydrates. oz.	Cost in cents.
1 1-2 lbs. corn beef	6.96	1.54	-	15
3 lbs. cabbage	.80	-	2.00	6
2 lbs. flour	3.84	.48	22.88	6
2 lbs. potatoes	.64	-	6.62	2 1-2
1 lb dried peas	3.68	.32	8.32	5
3 1-2 lbs bread	3.36	.28	29.06	8 1-20
1-2 lb. bacon	.24	6.40	-	6
1-4 lb. butter	-	3.33	-	6 1-4
1-8 lb. suet	-	1.96	-	1
1-2 lb. pearl barley	.88	.12	5.72	4
1 qt. skim milk	1.06	.24	1.65	4
1 pt. whole milk	.58	.62	.83	3 1-2
1-8 lb coffee	-	-	-	3 4-10
1-2 lb. sugar	-	-	7.92	3 1-2
Fruit	-	-	-	3
Total	22.04	15.29	85.00	77 1-5
Required	19.19	12.42	78.03	78

AIR DISTRIBUTION. The iron conduits are proportioned for a maximum flow rate of 1200 linear feet per minute, and the area of the flues are scheduled for a flow rate of 600 feet. By means of dampers in the conduits and at the bases of the flues the air movement may be directed and distributed as desired.

It is assumed that the rooms are to be continuously warmed and ventilated only when occupied, and that the air furnished by the fan is primarily for the purposes of ventilation and not for heating. For ventilation alone the air need be heated only to the point of comfort, as 70°, or under. If, as in early morning heating, the fan current is also used for warming, its temperature may be anything desired within the range of the apparatus.

The method of quick heating in the morning by a rotation of the air of the rooms through the fan is to be recommended on the ground of economy. In all but the severest weather the steam may be shut off from the extension at night, and at six o'clock or later next morning the doors may be opened between the rooms and the hallways, and from the basement hallway into the fan room, and from the fan room into the heater's connection with the window. Steam may then be put on the entire system and the fan started. One hour of rapid circulation will generally be found sufficient to bring the rooms to a comfortable temperature. At eight o'clock the fan and heater may be adjusted for their day's work of ventilation only.

The air is to be directed where the occupants are assembled. When the Senate and House are in session, the air is to be cut off from the committee rooms and directed to the assembly halls, and *vice versa*. The only rooms which it is necessary to continuously ventilate are those permanently occupied by the several departments of State.

The schedule of rooms supplied directly from the fan is as follows: Rooms marked (C) were at the time of scheduling assigned to committee uses, and all others to State departments. All work has been done on the basis furnished by this schedule, and the system cannot be held responsible for any results growing out of changes from the schedule arrangement and uses of rooms.

Rooms.	Area of Flues, square feet. Supply.	Discharge.	Required Air Volume, cubic feet per hour.	Measured Air Volume.
Basement.				
S. E. Room	0 50	1.00	18,000	
S. W. "	0.50	1.00	18,000	
W. M. "	0.50	1.00	18,000	
N. W. "	0.50	1.00	18,000	
			72,000	
First Floor.				
S. E. Room	1.25	2.50	45,000	
S. M. "	0.50	1.00	18,000	
S. W. "	0.50	1.00	18,000	
W. M. "	1.25	2.50	45,000	
N. W. "	1.25	2.50	45.000	
N. M. "	0.30	0.60	11,000	
N. E. "	0.20	0.40	7.000	
			180,000	
Second Floor.				
S. E. Room (C)	1.25	2.50	45,000	26,000
S. M. " (C)	1.25	2.50	45,000	38,000
Library.............	1.50	3.00	54,000	65,000
N. M. Room	0.25	0.50	9,000	13,000
N. E. " (C)	1.25	2.00	45,000	
			198,000	
Third Flour.				
S. E. Room (C)	0.75	1.50	27.000	27.000
S. M. " (C)	1.25	2.50	45,000	35,000
S. W. " (C)	2.00	4.00	72.000	56.000
W. M. " Court...	2.00	4.00	72,000	58,000
N. W. " (C)	2.00	4.00	72 000	76.000
N. M. " (C)	0.75	1.50	27.000	26,000
N. E. " (C)	0.75	1.50	27.000	25.000
			342,000	

Main Building.	Required. Minimum.	Maximum.	Measured.
House of Representatives	300.000	750.000	526,000
Senate	90,000	300,000	133.000

The supply for department rooms is based on the largest number of permanent occupants each is likely to accommodate, and that for committee rooms on a maximum rate of air change of six times an hour. The tests were confined chiefly to rooms farthest removed from the fan, as those most likely to be given less than their proportion of supply. All tests made in the basement and first floor

rooms showed their supply to be in excess of requirement. The results above given were obtained by measuring the rate of air flow through the registers and assuming the effective area of the registers as two-thirds that of its face, a method which generally gives minor rather than major values. By partially closing the dampers belonging to the basement and first floor rooms, and, if necessary by speeding up the fan to two hundred and fifty revolutions, the full maximum of air required may be furnished the most remote rooms, should such quantities ever be called for.

THE HALL OF THE HOUSE OF REPRESENTATIVES. The minimum supply to this room is based on an attendance of two hundred, and the maximum supply to a possible attendance of five hundred, on rare occasions. The air conveyed from the fan by two iron conduits, enters the under floor space at the two western corners, and finds entrance into the room through floor registers under the members' fixed chairs and next the eastern wall. The aggregate free area of these inlets is 8,320 square inches, or fifty-two square inches to each member. To supply the minimum volume the velocity of flow must therefore be seventeen inches a second through the register *openings*. The air movement above the registers being diffused over their entire area, the minimum and the maximum velocities will be practically reduced to twelve and thirty inches.

It is a matter of regret that the necessities of floor and desk arrangements were regarded as adverse to the method of inlet proposed in my communication of June 8th, '89, and designed to reduce the danger of troublesome draught to a minimum. The per capita inlet area obtainable by that method was shown to be 180 square inches, and its position, directing the flow of entering air into the aisles, would have been favorable to the least possible disturbance from draught effect. The significance of such details in arrangement cannot be rightly appreciated until the fatality of a sensible draught to any system of ventilation is accepted as a guiding fact of the first importance in the designing or choosing of methods.

When the air moved by the fan making 196 revolutions was diverted from the committee rooms to the House and Senate Chambers, the quantity entering the House was found to be 526,000 cubic feet per hour, sufficient to give 300 occupants 1,750 cubic feet per hour each, or to "change" the air of the hall once every nine or ten minutes. To neutralize the heating effect of the

audience, the air supplied in such quantity must have a temperature lower than that of the room by about 0.009° for each occupant when the outside temperature is at or near 0°, and this difference must be greater as that between in-door and out-door temperature is less.

To roughly test the correctness of theoretical computation 216 candles, evenly distributed over the desks, and eighteen gas jets were burned for one and half hours with the following results:

	Beginning.	End.
West side of hall, five feet from floor,	62.0°	62.5°
East side of hall, five feet from raised floor,	64.0°	68.0°
Air supply,	64.0°	64.5°
Gallery, men's side,	66.0°	68.5°
Attic vent., over women's gallery,	68.0	72 0°
Outside air,	4.0°	5.0°

The computed heat developed by the burning of the gas and the candles equals that produced by about 300 average adults; but the greater concentration of warm air currents rising from the flames as compared with the more diffused current rising from an occupant in sitting posture caused a somewhat lower floor temperature than would have resulted had 300 men crowded the floor space. The unprotected east side thermometer was, doubtless, effected by radiation from the candle flames, and, therefore, failed to register the air temperature. The increase in atmospheric temperature is best indicated by the two gallery thermometers taken in connection with the air volumes moved through each gallery vent. The proportions of air passing out through the men's gallery was twice that finding exit through the women's gallery. The resulting temperature increase for the total air moved would be 2.8°. The theoretical increase due to the presence of 300 occupants would have been 2.7°.

It may therefore be safely assumed that for 250 occupants, and each supplied with 2,500 cubic feet of air per hour, the temperature of the supply should be kept about 3° below that of the discharge air. The number of occupants being constant, the temperature of the supply must be reduced in proportion to the reduction of the supply volume. If, on the other hand, the supply remains constant in volume and the number of occupants vary, the temperature difference between supply and discharge must vary as the number of occupants.

It is not expected that the very best results obtainable can give satisfaction to every occupant of the hall. The varieties of tem-

perature, humidities and climatic and other conditions to which they are habituated in their domestic, business, or out door life cannot be furnished within the hall at one and the same time. A temperature of 65° cannot be furnished the occupant of one desk, and a temperature of 75° to another, or dry air to one and humid air to another, or "lively" air to this member and motionless air to that. Only the thoughtless can imagine as possible such a provided variety of local conditions within one room, and only the selfish will demand that condition throughout the room which is agreeable to himself. All are to come to atmospheric conditions as nearly equable as it is possible to maintain them. These conditions are chosen with reference to the greatest comfort of the greatest number, and to them all are expected to adapt themselves in clothing or otherwise, as much as though they were going to a fixed climate where the man who is too warm must wear lighter clothing, and the man who is too cold, heavier clothing, and the man with cold ankles must doff low shoes for boots. The utmost to be attempted in artificial warming and ventilation is to provide such conditions as shall make it possible for every occupant to make himself comfortable with proper clothing, and with the least amount of total individual adaptation. Such adaptation there must be, and the attempt to avoid it by adjusting the conditions to special idiosyncrasies will prove disastrous. The idiosyncrasy must adapt itself to the common comfort, and not be allowed to impose discomfort on the many by demanding personal gratification at their expense. For this reason the engineer should receive orders only from the President of the Senate and the Speaker of the House, with reference to their respective rooms, or from such officer as may be duly authorized to direct the proper warming and ventilation of the House.

THE SENATE HALL. The large per capita floor space and the arrangement of seats in this room make a special provision for the distribution and diffusion of the air supply less necessary than in the House. The scheduled minimum supply is 90,000 cubic feet per hour for 45 occupants. The volume delivered with a fan speed of 196 revolutions was found to be 133,000 cubic feet. A fan speed of 250 revolutions would result in a supply of 170,000 cubic feet as against the 300,000 scheduled maximum. On the rare occasions when such maximum quantities are required for the House and Senate they may be had by shutting off the extension and directing the full volume of air moved by the fan to the House

and Senate. It is doubtful, however, whether, with the present arrangement of inlet in the House, such a supply would be tolerable in that room.

THE DIRECT HEATING SYSTEM. The entire apparatus for this work seems to be doing its work admirably in the circulation and distribution of steam, in the return of condensed water, and in noiseless action. The amount of heating surface required for each room, and the form best adapted to the rooms used were carefully determined with reference to the extent, character and exposure of cooling surfaces, and the heater's location. For obtaining the greatest thermal efficiency of the radiators and their best effect in preventing cold floors, as well as for the purpose of locating them with reference to the least possible floor obstruction, they were planned for the window recesses. Architectural necessities prevented the complete carrying out of this plan, and the altered position of some and form of others somewhat impairs their action.

They were designed—with the aid of an open fire—to keep the rooms comfortably warm in the severest weather (-20°) for which the entire system is planned. They have been tested when the outside temperature was 15° above, with no fires in the fireplaces, the fan stopped and a fresh westerly wind blowing, and also when the outside temperature was 15° below, only a light wind blowing, the fan circulating air at 70° for two hours in the early morning and no hearth fires in use.

The results are given below, together with the scheduled and actual heating surfaces for each room, (R) indicating a removal of some or all of the surfaces from window recesses, and (F) a change in form from that scheduled. The temperatures were taken in every case by means of a rapidly whirled thermometer, in order to expedite work as well as to reduce the effect of wall radiation and obtain atmospheric temperatures solely.

Rooms.	Square Feet of Radiator Surface. Scheduled.		Actual.	Temperature of Rooms with Outside Temperature. +15°	−15°
Basement.					
S. E.	45		45		
S. W.	60	(F)	42	67	
W. M.	78		78	74	
N. W.	108	(F)	144	74	
Hall	66	(F)	42		
First Floor.					
S. E.	156	(R)	144	75	
S. M.	45		45		
S. W.	84		56	60	64
W. M.	132	(F)	132	66	69
N. W.	180		180	70	70
N. M.	66		66	73	
Hall	90		90		
N. E.	66		66		
Telegraph Office	15		27		
Second Floor.					
Stairway	27		27		
S. E.	33	(R)	33	76	
S. M.	33	(R)	33 steam off.	62	
Library.					
S. W.	132		132		
W. M.	108	(F)	108 floor.	62	65
N. W.	156	(F)	156 loft.	70	72
N. M.	45		45	72	
N. E.	45	(R)	45	72	
Stairway	33		33		
Third Floor.					
Stairway	27		33		
S. E.	33	(R)	33	74	
S. M.	33	(R)	33	74	
S. W.	90	(R)	90	66	77
W. M.	54	(R)	54	65	
N. W.	132	(R)	132	69	
N. M.	30	(R)	30	72	
N. E.	30	(R)	30	78	
Stairway	33		33		

The temperatures were taken on the second day only in those rooms in which they had been found low on the milder day, it being assumed that they were by that test proved the most difficult to heat. The effect of the low temperature air supply distributed from

the fan on the morning of the second trial was to lower the higher room temperatures and to raise the lower. The steam pressure carried on the direct system during these tests was five pounds. By increasing this pressure the efficiency of the radiators may be so increased that it is doubtful whether open fires will be required in any but the most exposed rooms, or in the most extreme weather.

Double sashing the library windows would greatly aid in securing an equal distribution of the heat between the floor and the high ceiling, and may be found necessary. Such additional protection for the entire western exposure is to be advised on economic as well as hygienic grounds.

Rectifications promised and doubtless made with a view to bringing the heating surfaces in all rooms more nearly in correspondence with the amount and form of that scheduled and shown on plans will have a beneficial effect in equalizing temperatures The generally high temperatures of the southerly rooms is due to the sun and wind effect. On a cloudy day with a cold southerly wind, they would more nearly equal the northern rooms in temperature.

Automatic Regulation of Temperature. The steam heating surfaces are designed to meet the requirements of severe weather. They are too large for continuous use in milder weather; the heat yielded would then be too great. Reduced steam pressure in the distributing mains affords only partial relief. Intermittent supply of steam by valve manipulation is neither easy nor likely to be so well regulated as to maintain anything like uniformity in room temperature. The occupant, with sensibilities dulled by slow changes in temperature, shuts off the steam only when the heat becomes intolerable, or lets it on only as forced to do so by the persistent discomfort of chilliness. The effects are first, enervation resulting from habituation to high temperatures, which in turn demands a warmer than normal air for comfort, and, which increase susceptibility to cold: second, the general harmful results of the inevitable fluctuations attending this method of heat regulation; third, a general tendency to wastefulness through overheating and open window cooling in weather admitting of such a method of relief.

Any heating system, however perfect in plan, is in as much need of automatic means for adapting it to its variable duty as is the finest engine in need of a governor to adapt and hold it to its varied work. The larger the engine and the more fluctuating its work, the more imperative for its perfection do such automatic

means become. An engine without a governor would be anywhere condemned. The wastefulness, the affected health, the discomfort and complaint which attend the use of an unregulated heating system only wait a better knowledge of the available appliances for its automatic control to find expression in protest and condemnation when the means for such control are wanting.

An inspection of the above columns of temperatures will furnish sufficiently suggestive evidence of the value of automatism in heat regulation and will make unnecessary any further expression of regret that a lack of funds in the hands of the commissioners has thus far prevented them from authorizing the incorporation of the recommended means.

THE DISCHARGE VENTILATION. Provision for this part of the system has proved more difficult and is correspondingly less complete than that for any other part. This has resulted from the lack of wall space for the introduction of suitable wall flues. the necessity of placing many flues in the outside walls, and the encroachment of the mason or other work on the flue areas as provided in the schedule and plans. The locations of both supply and discharge flues were generally determined more by necessity than by considerations of efficiency, and in this matter the vent flues suffered most.

The value for ventilating work given to the fireplace flue is fifty per cent. in excess of that given to the same areas in cold air flues, because of the assumption that the fire-places would be used for fires and the flues heated.

THE BOILER AND CHIMNEY POWER. These have been proved to have a safe residual capacity for the maximum duty likely to be imposed on them for warming and ventilating work. If it is the practice of the State to insure its property, the insurance of its boilers in such a company as the Hartford Boiler Inspection and Insurance Company is to be recommended as much for the value of their inspection and their oversight in the use of the boilers as for protection against loss.

As a matter of record, as well as for the purpose of a check upon the fireman and an incentive to the best work of which he is capable, a water meter (Worthington's special make for high temperature, ¾ inch, and costing $32) would serve a good purpose. The meter reading would show the weight of steam used, and that quantity compared with the weight of coal burned would indicate the char-

acter of work done in the boiler-room. In any case, and particularly if such a meter is to be used, the feed water from the main should be passed to the boiler through the tank and pump.

TELETHERMOMETER. For the use of the engineer a thermal indicator should be provided him in the engine room which should register the temperature of the Hall of Representatives, so that at any moment he may know the Hall temperature and be spared the necessi'y of leaving his room, climbing the stairs and entering the Hall for an observation of the themometers. Such an instrument is made by the Standard Thermometer Company and may be had for $130 or so.

SPECIFICATIONS AND RECOMMENDATIONS With the complete carrying out of the specifications and recommendations made in previous communications and with a due regard to the enclosed general directions for use, it is believed that satisfactory results may be had. Departure from either must be attended with effects not chargeable to the system as designed.

COST OF SYSTEM AND OF ITS USE. The estimated cost of the heating and ventilating apparatus proposed in the original plan was about $4,300, not including the boilers and their settings nor the fittings required by the halls of the Senate and House, nor the extra cost involved in the outside location of the boiler-house, and excluding the Johnson electric service.

The total cost of the combined plant has reach the sum of $7,500, of which $2,500 may be assigned to the boiler-rooms.

The cost of use may be included under two items, first, interest at eight per cent on the cost of the ventilating apparatus to cover interest on the investment and the cost of repairs; and second, the cost of an average of seventy-five pounds of coal for every 1,000,000 cubic feet of air passed through the fan during the months between the first of October and the last of May The latter item of cost must depend largely on the intelligence and skill of the engineer in the use of dampers and the fan. Except during the session of the legislature the dampers to the committee rooms and the Senate and Representatives' Hall may be closed, and 320,000 cubic feet an hour will supply the department offices. The committee rooms will require full ventilation only when crowded. The House with an attendance of 200 would be well ventilated by a supply of 400,000 cubic feet of air per hour, and the Senate with a 100,000 cubic feet supply for fifty occupants.

The present engineer has shown an interest, faithfulness and skill which augers well for the State's interest. That he may be better equipped for his work it would be well to provide him with an anemometer for the measurement of air flow and the regulation of air quantities supplied.

A good instrument is not the sole essential to a satisfactory product. Yet more essential is skill in the use of the instrument. A bungler cannot be relied upon to produce good results with a tool, however perfect. The system with which the State House is now furnished is nothing more than a somewhat complicated tool. Everything depends on the manner of its use. Its reputation either as a noteworthy success or a conspicuous failure rests largely in the hands of the user. It cannot be so made as to be incapable of misuse. The State's work is but half done in providing a good system ; it must furnish a competent controller and user. The warming and ventilation of the whole building should be placed under the exclusive charge of a competent authority with power to control all arrangements of valves, dampers, doors, transoms or windows necessary to the best results.

Not until this is done, and the best possible use made of the system, can unsatisfactory results be made chargeable to it.

In closing my report and my work for the State, allow me to express the pleasure afforded me in all my association with the Board of Commissioners and the State Board of Health, and in their cordial co-operation in the work to which they called me, and also in the respectful consideration accorded all my proposals and demands on the part of both the commissioners and the architects.

Respectfully submitted,

S. H. WOODBRIDGE.

To His Excellency the Governor, HON. EDWIN C. BURLEIGH, *Chairman of the Board of State House Commissioners, Augusta, Maine.*

BOSTON, January 1, 1891.

[See next page.]

The accompanying figures indicate certain of the methods recommended for use in the State House ventilation.

Figure 1 shows the desk arrangement proposed for the admission of air to the representatives' chamber.

Figure 2 shows the method advised for the discharge of air from that chamber into the attic, each gallery having its own vent through its ceiling and close to its rear wall into the same attic.

Figure 3 shows the designed and board vent from the attic, through the cupola stairway and cupola ceiling and dome, vent by open cupola door or window being considered unreliable because of varying wind action.

Figure 4 shows the pattern of roof ventilator proposed for the attic of the extension. It is designed to allow free egress of air and to prevent the entrance of rain and snow

Figure 5 shows the arrangement of check valve recommended for all but fireplace flues for the prevention of down draught through them, and to allow the escape of air when the supply to a room exceeds the discharge capacity of its fireplace. Such valves should be made of the lightest gossamer rubber cloth. They open freely for the egress of air, and close lightly against its movement in the reverse direction. In the absence of such check valves reversal is liable to occur, first, when the supply is shut off from a room and the ingress of air to supply that removed by the fireplace must be by inward leakage; second, when the attic air and that in the flues connected with it becomes so chilled and heavy as to overcome the tendencies, otherwise favorable, to the flow in the desired direction; third, when by the discharge of air into the attic through other channels than the flues is so free and the vent through the roof is so restricted as to produce a partial plenum condition within the attic space.

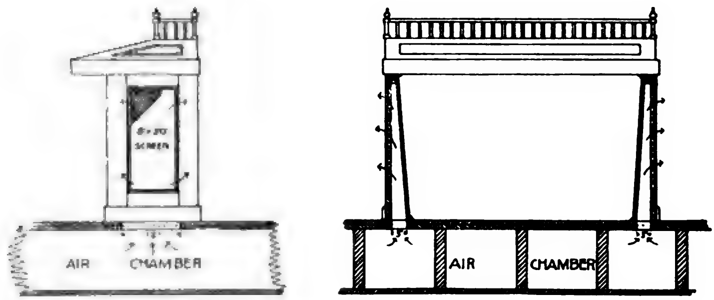

FIG. 1

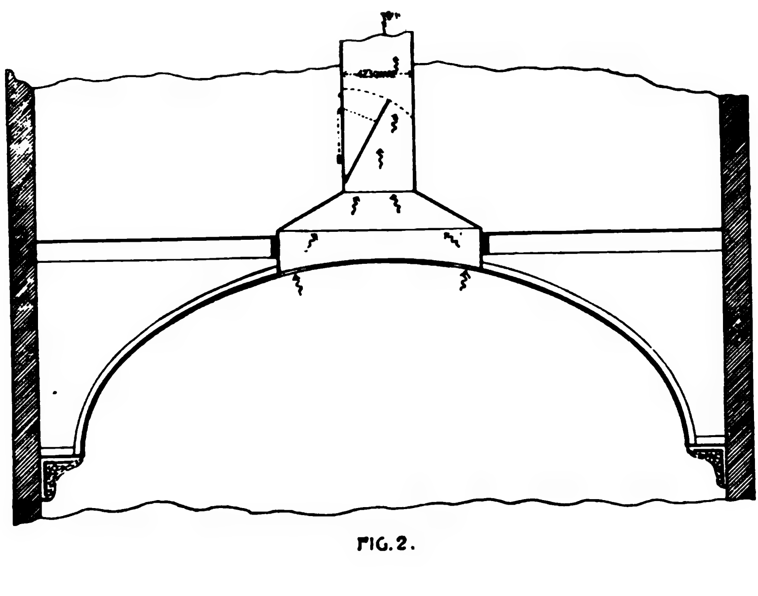

FIG. 2.

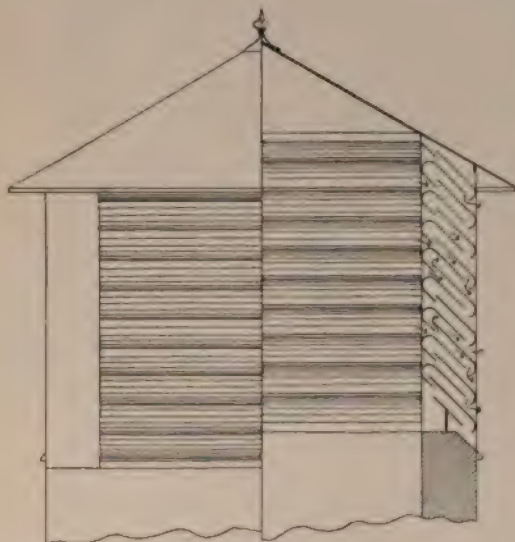

FIG. 4

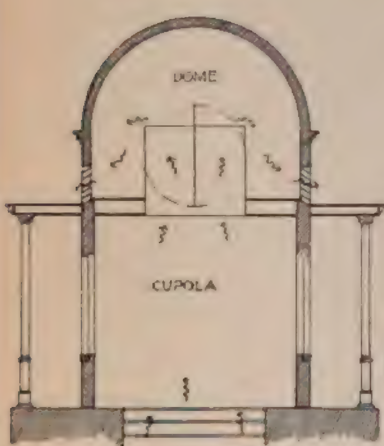

FIG. 3.

FIG. 5.

THE METRIC SYSTEM.

LENGTH.

1 Myriameter	Mm	(10.000 m.)	=6.2137 miles.
1 Kilometer	Km.	(1.000 m.)	=0.62137 miles.
1 Hectometer	Hm	(100 m.)	=328.0833 feet.
1 Decameter	Dm	(10 m.)	=393.7 inches.
1 Meter	M.	(1 m.)	=39.37 inches.
1 Decimeter	dm	(0.1 m.)	=3 937 inches.
1 Centimeter	cm.	(0.01 m.)	=0.3937 inch.
1 Millimeter	mm	(0.001 m.)	=0.03937 inch.

SURFACE.

1 Hectare	Ha.	(10,000 sq.m)	=2.471 acres.
1 Are	a	(100 sq. m.)	=119.6 square yards.
1 Centare	ca	(1 sq. m.)	=1550 square inches.

CAPACITY.

1 Kiloliter or Stère	Kl. or st.	(1,000 l.)	=61027.0515 Cu. inches,	=264.17 gallons.
1 Hectoliter	Hl.	(100 l)	=6102.7052 Cu. inches	=26.417 gallons.
1 Decaliter	Dl.	(10 l.)	=610.2705 Cu. inches	=2.6417 gallons.
1 Liter	l.	(1 l.)	=61 0271 Cu inches	=1.0567 quarts.
1 Deciliter	dl.	(0.1 l.)	=6.1027 Cu. inches	=0.845 gill.
1 Centiliter	cl.	(0.01 l.)	=0 6103 Cu. inch	=0.338 fluid ounce.
1 Millileter	ml.	(0.001 l.)	=0.0610 Cu. inch	=0.27 fluid drachm.

WEIGHT.

1 Millier or Tonneau	M. or T	(1,000 Kg.)	=1 Kl. or 1 Cu. m	=2204.6 lbs.(avoird)
1 Quintal	Q.	(100 Kg.)	=1 Hl. or 0.1 Cu. m.	=220.46 pounds.
1 Myriagram	Mg.	(10 Kg.)	=1 Dl. or 10 Cu. dm.	=22.046 pounds.
1 Kilogram	Kg	(1,000 g.)	=1 l. or 1 Cu. dm.	=2.2046 pounds.
1 Hectogram	Hg	(100 g.)	=1 dl. or 0 1 Cu. dm.	=3.5274 ounces.
1 Decagram	Dg.	(10 g.)	=1 cl. or 10 Cu. cm.	=0.3527 ounce.
1 Gram	g.	(1 g.)	=1 ml. or 1 Cu. cm.	=15.432 grains.
1 Decigram	dg.	(0.1 g.)	=0.1 ml. or 0.1 Cu. cm.,	=1.5432 grains.
1 Centigram	cg.	(0 01 g.)	=0.01 ml. or 10 Cu. mm.,	=0 1543 grain.
1 Milligram	mg.	(0.001 g.)	=0.001 ml. or 1 Cu. mm.,	=0.0154 grain.

One kilogram is equal to a weight represented by one liter of distilled water at 4 degrees C.

One inch = 2.5 centimeters nearly; one quart (wine measure) = 0.946 liter; one pound Troy = 0.373 kilogram; one acre = 0.4046 hectare.

To reduce (approximately) grains to grams, divide by 10 and from the quotient subtract one-third of itself; to reduce drachms to grams, multiply by 4; to reduce ounces to grams, multiply by 32.

To convert degrees of one thermometer scale into those of another. Fahr. into Cent.—Divide by 9, multiply by 5 and deduct 32; Cent. into Fahr.—Multiply by 9, divide by 5 and dd 32.

GLOSSARY.

This Report has been prepared for the benefit of all classes of persons in the State, and it has been the wish to make its language as clear and intelligible as possible. A few technical terms, however, are so inseparably interwoven into the consideration of the subject of public hygiene that the avoidance of their use is impossible, and as it is desirable that the general public should become acquainted with their meaning, and especially to know in what sense they are used in the present work, this Glossary is introduced.

Aerobic. Applied to bacteria that can flourish only in the presence of air.

Ætiology. [See Etiology].

Anaerobic. Applied to bacteria that can grow in the absence of air.

Anorexia. Want of appetite.

Antiseptics. Agents which prevent or retard putrefaction; or as now understood, those which prevent the development of pathogenic or fermentative organisms. Some of these which, in weaker solutions, act as antiseptics, in stronger solutions, being destructive of the life of the organisms, are also disinfectants.

Axilla. The arm-pit.

Bacilli. The plural of bacillus.

Bacillus. One genus of bacteria in which the length of the cells distinctly exceeds their thickness. They are sometimes arranged in threads.

Bacillus anthracis. The bacillus of anthrax, the essential cause of the disease.

Bacteria. Unicellular organisms, microscopic in size, on the border land between the vegetable and the animal kingdom, but now regarded as pertaining to the former. Schizomycetes.

Bacteriology. That branch of science relating to the bacteria.

Bacterium The singular of bacteria.

Caecum. The uppermost part of the large intestine, next to the ileum, and separated from it by the ileo-caecal valve.

Cannula. A small tube.

Caseation. A degenerative change into a substance resembling cheese.

Clinical. Pertaining to a bed. Clinical observations are observations which are made at the bedside of the patient.

Contagion. The specific cause of certain diseases by means of which they may be transmitted. Also applied to the act of transmission of communicable diseases.

Contagious. Capable of being transmitted by contagion; communicable; infectious. But little effort has been made in this report to discriminate between the meaning of Contagious and Infectious; although their derivation and original application were different, most of the later medical writers of Europe and America use the two words interchangeably. This, at least in works for popular use, is the less confusing way.

Coryza. Cold in the head.

Cyanosis. A bluish color of the skin due to lack of oxygen in the blood.

De novo. Anew. As applied to the origin of infectious diseases, their appearance independent of the contagion of preceding cases.

Deodorants. Substances which destroy offensive smells. Some, but not all deodorants, are also disinfectants. (See Disinfectants.)

Desquamation. The shedding of the outer skin, usually in scales, after scarlatina and some other diseases.

Diagnosis. The determination of the character of a disease.

Diagnosticate. To determine the character of a disease.

Diastase. A nitrogenous principle developed in grain during fermentation, and having the property of converting starch into that form of sugar which is called glucose.

Diplococcus. Double bacteria, of those which are constricted in the centre in the process of division.

Disease germs. Disease-producing bacteria. Micro-organisms whose reception into the system, and multiplication in it, produce the contagious diseases.

Disinfectants. Agents or substances by means of which the contagion of diseases may be destroyed. Often improperly applied to substances which, though useful as deodorants or antiseptics, are nearly or quite valueless as germicides.

Duodenum. The first and upper portion of the small intestine.

Dyspnoea. Difficult or labored breathing.

Endemic. Applied to diseases which prevail in particular localities of districts, and which are due to local conditions or causes.

Enteric fever. Typhoid fever.

Enzyme. A chemical ferment.

Epidemic. Common to, or affecting many people at the same time; generally prevailing; the causes of epidemics were formerly very generally regarded as depending upon an "epidemic constitution of the atmosphere," but of this there has never been collected any satisfactory proof. The more we study epidemiology the more we are led to look to contagion and the laws which govern its diffusion for an explanation of the occurrence of epidemics.

Epithelium. The outer layer of the skin and mucous membranes.

Epizootic. Applied to the diseases of animals in the same sense as epidemic is used with reference to human diseases; affecting many animals at the same time.

Epistaxis. Nose-bleed.

Etiology. The causation of diseases.

Fauces. The throat; the posterior part of the mouth, terminating with the pharynx and larynx.

Fission. Division; the common method of multiplication with many of the lowest organisms.

Fomites. Substances or articles which are liable to carry the contagion of diseases.

Germicides. Destroyers of germs; disinfectants.

Glandular. Relating to glands.

Haemoptysis. Bleeding from the lungs or air passages.

Haemorrhage. Loss of blood.

Hectic. Pertaining to consumption or to a wasting.

Hepatization. A change through which the structure of the lungs or other organs comes to resemble liver.

House-drain. That part of the house-drainage system which carries the wastes from the soil-pipe and waste-pipe to the sewer.

Hygiene. The science and art relating to the preservation of health.

Hyperplasia. Exaggerated increase in the elements of a part.

Ileum. The third or lower portion of the small intestine.

Incubation. Hatching; as applied to diseases, that period between the reception of the infection and the appearance of the first symptoms.

Infection. Contagion; the specific cause of communicable diseases, now known in many diseases, and supposed in others, to be a microscopic organism.

Infectious. Communicable, as a disease; contagious. (See Contagious.)

Immunity. Freedom from liability to disease.

Inoculation. Insertion of a known or suspected virus into the tissues of an animal or into a test-culture.

Laryngitis. Inflammation of the larynx.

Lesion. A wound, injury, or morbid change of a part.

Malaise. Uneasiness, discomfort.

Meningeal. Pertaining to the meninges.

Meninges. The membranes that envelop the brain and spinal cord.

Meningitis. Inflammation of the meninges.

Mesentric. Pertaining to the mesentery.

Mesentery. The double fold of peritoneum connecting the small intestines with the posterior wall of the abdominal cavity.

Meteorological. Pertaining to meteorology, or that science which treats of the air and its phenomena.

Miasm. A term vaguely applied to noxious exhalations.

Miasma. The same as miasm.

Microbe. Bacterium; micro-organism.

Micrococcus. A genus of the bacteria, consisting of very small, globular or oval organisms.

Micro-organism. A minute organism.

Non-pyrexial. Without fever.

Nosology. Classification of diseases.

Œdema. A swelling from effusion of serous fluid into the cellular tissues.

Papule. A pimple, or small elevation of the skin containing no visible fluid.

Pathogenic. Generative or productive of disease.

Pathological. Pertaining to pathology; diseased.

Pathology. The knowledge of diseases.

Peritoneum. A serous membrane investing the abdominal walls and viscera.

Phthisis. Consumption; pulmonary tuberculosis.

Physiology. The science which treats of the functions of living animals or plants.

Pleura. The serous membrane lining the cavity of the chest.

Pleurisy. Inflammation of the pleura.

Prognosis. The prediction, from the present symptoms of a disease, of its future course or termination.

Proteids. Non-crystallizable substances including nitrogen in their composition, partly of animal and partly of vegetable origin.

Pseudo-membrane. False membrane.

Ptomaines. Basic compounds resulting from putrefactive changes in animal tissues. Many are highly poisonous.

Remittent. A form of fever in which there is no complete intermission, but only an abatement of symptoms.

Sanitaria. Plural of sanitarium.

Sanitarium. An establishment for the cure of diseases.

Scarlatina. Another name for scarlet fever.

Schizomycetes. A class of unicellur organisms multiplying by fission and also in some cases by the formation of spores. Bacteria.

Septic. Pertaining, or due to putrefaction.

Serous. Relating to serum, or to the membranes which secrete it.

Serum. Watery, clear or yellowish, animal fluids, exhaled by serous membranes, or separated from the coagulable parts of other fluids, like blood or milk.

Sewage. The liquid or other filth conveyed in sewers.

Sewer. A drain for conveying dirty water and filth.

Sewerage. A system of sewers.

Soil-pipe. The pipe which conveys excreta from water-closets and urinals. (See House-drain.)

Sporadic. Applied to diseases, it means occurring in single or scattered cases, as opposed to epidemic or endemic, in which numbers, or many are affected.

Spores. Minute particles or bodies which are formed within many of the lower flowerless plants, and which perform the functions of seeds. The microscopic one-celled plants called bacteria, multiply by fission, and in addition to this, some of them multiply by means of spores.

Sporification. The formation of spores.

Staphylococcus. A genus of round bacteria, or cocci, arranged in groups like clusters of grapes.

Stenosis. A narrowing.

Sterilize. As used in bacteriology, the freeing of culture fluids or other substances, of bacteria which are capable of development.

Streptococcus. Cocci or round bacteria, arranged in rows or chains.

Therapeutical. Pertaining to the art of healing.

Tonsilitis. Inflammation of the tonsils.

Trap. An arrangement on some part of the sewerage system, usually a bend in the pipe in which water stands, by means of which we seek to prevent the return of gases and disease germs into the building.

Tubercle. Nodules of greatly varying size constituting the disease tuberculosis.

Tuberculosis. A specific disease usually characterized by the formation of tubercles. Pulmonary consumption is a tuberculosis of the lungs.

Typhoid fever. Meaning literally a fever resembling typhus. The common fever of this country. Formerly typhus and typhoid were not distinguished the one from the other. Typhoid fever is communicable only in a slight degree, if at all, by direct contagion; but there is great danger of its spread from the sick to the well from defective sanitary arrangements and regulations.

Typhus fever. A dangerously contagious disease rarely found in this country, and when appearing in our State, probably always by importation. (See Typhoid fever.)

Umbilicated. Marked by central depression.

Varioloid. Small-pox modified by vaccination. It is contagious, and cases of small-pox as severe may arise from exposure to its infection as from unmodified small-pox.

Vesicle. An elevation of the cuticle usually containing a clear fluid; a blister.

Virus. An infective agent.

Waste-pipe. That part of the house-drainage system which conveys the waste-water from sinks, baths, etc.

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